United States Court of Appeals

for the

District of Columbia Circuit

TRANSCRIPT OF RECORD

APPENDIX TO BRIEF FOR APPELLANTS

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA

No. 7821

BALDWIN-SOUTHWARK CORPORATION AND
ROBERT F. BLANKS, *Appellants*,

v.

CONWAY P. COE, COMMISSIONER OF PATENTS,
Appellee.

UNITED STATES
COURT OF APPEALS FOR
DISTRICT OF COLUM
FILED APR 30 1941
Joseph W. Stewart
747

Appeal from the District Court of the United States for the for the District of Columbia.

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No. 7821.

BALDWIN-SOUTHWARK CORPORATION AND
ROBERT F. BLANKS, *Appellants,*

v.

CONWAY P. COE, COMMISSIONER OF PATENTS,
Appellee.

Appeal from the District Court of the United States for the for the District of Columbia.

APPENDIX TO BRIEF FOR APPELLANTS.

COMPLAINT.

1 Endorsed: Filed Jul 17 1939 Charles E. Stewart, Clerk

District Court of the United States
For the District of Columbia

Civil Action No. 3460

BALDWIN-SOUTHWARK CORPORATION, Paschall Post Office Station, Philadelphia, Pennsylvania, and ROBERT F. BLANKS, 394 South Vine St., Denver, Colorado, *Plaintiffs,*

vs.

CONWAY P. COE, as Commissioner of Patents, *Defendant.*

Complaint for Issuance of Patent

The plaintiff, Baldwin-Southwark Corporation, a corporation organized under the laws of the State of Delaware, and Robert F. Blanks, a resident of Denver in the County of Denver, State of Colorado, bring this suit against Conway P. Coe in his official capacity as Commissioner of Patents, and allege:

1. Plaintiff, Baldwin-Southwark Corporation, is a corporation organized under the laws of the State of Delaware, and plaintiff, Robert F. Blanks, is a resident of Denver in the County of Denver, State of Colorado, and the defendant, Conway P. Coe, is the Commissioner of Patents of the District of Columbia and his official residence is in Washington in the District of Columbia, and is sued as Commissioner of Patents of the United States.

2. Jurisdiction is founded upon the provisions of Section 4915 of the Revised Statutes of the United States and upon diversity of citizenship of the parties.

3. The plaintiff, Baldwin-Southwark Corporation, is the owner, by assignment recorded October 26, 1932 in Liber L 154, page 425 of the assignment records of the United
2 States Patent Office, of all the right, title and interest in an application for patent filed in the United States

Patent Office by Robert F. Blanks on October 11, 1932 for Materials Testing Equipment, Serial Number 637,298.

4. That the said Robert F. Blanks was the first and true inventor of the said invention; that the same is new and useful, and was not known or used by others in this country before the said invention thereof, and not patented or described in any printed publication in this or any foreign country before his invention thereof or more than two years prior to his application for patent therefor, and not in public use or on sale in this country for more than two years prior to said application, and not patented in any foreign country by the applicant or his legal representatives on an application filed more than twelve months prior to said application for United States patent and not abandoned.

5. That the said application was filed in accordance with the laws of the United States and has been duly prosecuted in accordance with the laws of the United States and the rules of the Patent Office.

6. The primary examiner refused to allow the following claims:

1. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate of applying load to the specimen.

2. The combination set forth in claim 1 further characterized in that said indicating member which is driven at a predetermined rate of speed has provision whereby it may be manually reset.

3 3. The combination set forth in claim 1 further characterized in that said indicating members are in superimposed relation.

4. The combination set forth in claim 1 further characterized in that supporting means are provided for said indicating members whereby they may move in alignment with each other.

5. The combination set forth in claim 1 further characterized in that means are provided for supporting said indicating members for rotation about a common axis.

6. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a stress indicating hand, an auxiliary hand, means for rotatably supporting said hands in superimposed axial relation, means for driving said auxiliary hand at a predetermined rate of speed, and means whereby the other hand is adapted to be driven in response to the test load, whereby the relative positions of said hands may be used to determine the rate of applying load to the specimen.

7. The combination set forth in claim 6 further characterized in that the driving means for the auxiliary hand has provision for driving the same at a constant rate of speed.

8. The combination set forth in claim 6 further characterized in that the driving means for the auxiliary hand has provision for driving the same at different constant rates of speeds.

9. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a dial face, a hand rotatable thereover, means for actuating said hand in accordance with a condition of a test specimen, an auxiliary hand having a rotatable support disposed forwardly of said dial face, and means for driving said auxiliary hand at a predetermined rate of speed.

19. In a pressure gauge for use in progressively applying fluid pressure at a desired time rate, a dial, a rotable fluid pressure indicating hand mounted on a shaft and movable over said dial, an auxiliary hand rotatable about the same axis as said pressure indicating hand and movable over said dial, and means for driving said auxiliary hand at a constant speed.

20. In a pressure gauge for use in progressively applying fluid pressure at a desired time rate, a dial, a rotatable fluid pressure indicating hand mounted on a shaft and movable over said dial, operating mechanism for moving said hand in response to pressure changes in a line leading to said pressure gauge, an auxiliary hand rotatable about the same axis as said pressure indicating hand and movable over said dial, and means independent of the operating mechanism of the pressure indicating hand for driving said auxiliary hand at a constant speed. 4

22. In a pressure gauge, a dial, a rotable pressure indicating hand movable over said dial, an auxiliary hand rotatable about the same axis as said pressure indicating hand, means for driving said auxiliary hand at a constant speed, and reset means for manually positioning said auxiliary hand.

23. The combination in an apparatus for effecting a predetermined rate of load change applied to a test specimen in a materials testing machine having opposed specimen-engaging elements one of which is moved to apply load to the specimen; comprising, a rate of load member movable at the precise predetermined rate of speed at which it is desired to apply load progressively to a specimen at each instant during a test irrespective of deformation characteristics of the specimen, means for continuously driving said member at said speed, a load indicating member movable in accordance with the actual load applied to the specimen and movable adjacent to said rate of load member in visible register therewith so long as load is actually applied to the specimen at said predetermined rate, means for actuating said load indicating member solely in accordance with the load force applied to the specimen, and adjustable means for controlling the application of load to the movable specimen engaging element of the testing machine whereby the operator may control the application of load force to the specimen and simultaneously observe whether said registered relation is being maintained.

7. Said applicant appealed to the Board of Appeals from the refusal of the primary examiner to allow said claims, and on or about June 16, 1939 said Board of Appeals affirmed the said ruling of the primary examiner.

Wherefore plaintiffs bring this suit in equity under and in accordance with the provisions of the statute in such cases made and provided and pray this Honorable Court:

1. To decree that the plaintiff, Robert F. Blanks is the true, first and sole inventor of the subject matter of the said claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 19, 20, 22 and 23, and that the plaintiff, Baldwin-Southwark Corporation, as assignee of all right title and interest in and to the said invention and application of said Robert F. Blanks is entitled to receive Letters Patent of the United States for such invention.

2. To authorize the Commissioner of Patents to issue to the said Baldwin-Southwark Corporation as assignee of the said Robert F. Blanks, a patent on the above designated application, including the subject matter of the said claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 19, 20, 22 and 23.

3. For such other and further relief as equity may require.

BALDWIN-SOUTHWARK CORPORATION

By WM. H. HARMAN
Vice-President.

Attest:

CHARLES E. ACKER
Secretary.

JOHN B. BRADY,
Solicitor for Plaintiffs

EDWARD A. HATHAWAY
CLIFTON V. EDWARDS
Of Counsel.

JOHN B. BRADY
National 4806
Barrister Bldg.,
635 F Street, N. W.
Washington, D. C.

State of Pennsylvania,
County of Philadelphia, ss:

Wm. H. Harman, being duly sworn, deposes and says that he is Vice-President of Baldwin-Southwark Corporation, one of the plaintiffs in the foregoing complaint; that he has read the same and knows the constents thereof, and that the same is not made by the plaintiff, Baldwin-Southwark Corporation, personally, because it is a corporation.

WM. H. HARMAN

Sworn to before me this 13th day of July, 1939.

MARY A. MULLIN
Notary Public

(Seal) My Commission expires March 9, 1943.

6 ANSWER TO THE COMPLAINT

Filed Jul 28 1939

To the Honorable the Justices of the District Court of the United States for the District of Columbia.

1. Defendant admits the allegation of the organization of plaintiff Baldwin-Southwark Corporation, and the allegation of the residence of the plaintiff Robert F. Blanks. He admits the allegations of defendant's official position and official residence in the District of Columbia but avers that his legal residence is in the State of Maryland.

2. He admits the allegation of jurisdiction under Section 4915 R. S. (U. S. C., title 35, sec. 63.)

3. He admits the allegation of assignment to plaintiff Baldwin-Southwark Corporation of an application filed in the Patent Office by Robert F. Blanks on October 11, 1932, for Materials Testing Equipment, to which application Serial No. 637,298 was given.

7 4. He admits that in said application the plaintiff Robert F. Blanks made averments corresponding to the allegations of paragraph 4 but denies that such allegations are sufficient to warrant the allowance of a patent on said application.

5. He admits, for the purpose of this suit, that the application was filed in accordance with the laws of the United States and has been duly prosecuted.

6. He admits that the primary examiner refused to allow the claims of said application, which are set forth in paragraph 6.

7. He admits that from the refusal of the primary examiner to allow said claims an appeal was taken to the Board of Appeals of the Patent Office and that the said Board of Appeals affirmed the rejection of said claims. He denies that the rejection of the said claims was improper since these claims are deemed to be unpatentable in view of the leaflet published by Ernst Krause & Co., prior to October 11, 1930, and for the reasons given in the statement of the examiner in answer to the appeal and the decision of the Board of Appeals, copies of which will be furnished at the trial. Profert of a copy of the leaflet mentioned and depositions establishing publication thereof is hereby made.

W. W. COCHRAN,
Law Examiner, U. S. Patent Office,
Attorney for Defendant.

169 STIPULATION.

It is hereby stipulated and agreed by and between counsel for the parties to the above-entitled cause, this Honorable Court consenting, that certified copies of the following documents may be introduced in evidence at the trial of this proceeding as constituting the record of the Interference 69,554 in which the application was involved in the Patent Office.

Decision of the Examiner of Interferences dated July 30, 1935 in Interference 69,554 denying the motion to dissolve the interference.

Decision of the Examiner of Interferences dated January 6, 1936 in Interference 69,554.

Decision of the Examiner of Interferences dated February 26, 1936 in Interference 69,554.

Examiner of Interferences letter dated June 2, 1936 directing the issuance of a commission.

Interrogatories filed on or about June 24, 1936 with attached circular, Exhibit A.

Cross interrogatories filed on behalf of Blanks on or about July 17, 1936.

Objections to the interrogatories of Lewis filed on behalf of Blanks on or about July 17, 1936.

170 Consideration of the objections to interrogatories by the Examiner of Interferences dated July 28, 1936.

Depositions of witnesses Gadolla, Nitsch, Gosch, and Pfleger filed March 3, 1937 including the certificate and report of the United States Consul and the exhibits attached to said depositions.

Decision of the Primary Examiner dated April 28, 1938 in Interference 69,554.

Decision of Board of Appeals dated February 15, 1938 in Interference 69,554.

JOHN B. BRADY
Attorney for Plaintiff

October 18, 1940.

W. W. COCHRAN
Attorney for Defendant.

October 18, 1940.

Blanks Application.

Specification and Claims 1 to 9 Inclusive and Drawings, as Originally Filed.

80 This invention relates generally to materials testing apparatus and more particularly to an improved method and apparatus for assisting in applying a predetermined rate of load change to a specimen being tested whether under compression, tension or other forms of stress or strain.

In studying stress and strain characteristics of materials it has heretofore been attempted in certain classes of tests to apply a load to the specimen at a constant rate as by having the operator listen to a metronome and then manipulating the testing machine controls in an attempt to have the stress indicating hand move in timed relation to the beats of the metronome. This obviously requires an appreciable degree of skill on the part of the operator principally because of the isolated relation between the stress hand and timing instrumentality with consequent lack of physical coordination therebetween thus requiring the operator to attempt to coordinate his sense of sight of the indicating hand with his sense of hearing of the metronome.

In my improved method and apparatus it is possible to obtain not only a predetermined rate of loading preferably at a constant rate but to do so with the utmost ease by two instrumentalities which are so mechanically related and coordinated that an operator may easily follow the rate of loading at any given instant and thus allow him to concentrate more easily upon the manipulation of the testing machine controls so as to insure maintenance of the predetermined rate of loading.

It is one object of my invention to accomplish the foregoing advantages and results by providing two instrumentalities having preferably similar paths of motion and placed in such cooperating relation that there is immediately available a direct visible comparison between the same whereby when one is driven at a predetermined
81 rate the other can be made to follow the same by adjustment of the testing machine controls. A more specific object is to provide a stress indicating hand rotatable over a suitable dial or scale and to provide an auxiliary load-rate hand rotatable about the same axis of the stress indicating hand, these hands thus being in superimposed relation in an axial direction, which would not necessarily be coaxial, whereby when the auxiliary hand has a constant or some predetermined rate of rotation the operator may instantly see whether the stress hand is travelling at the same rate as the auxiliary hand. If the two hands

travel together then it is known that the load is being applied to the specimen at the desired rate as governed by the auxiliary hand. If the stress hand should tend to lead or lag the auxiliary hand, the operator may immediately adjust the testing machine controls so as to bring the stress hand into synchronism with the auxiliary hand which is also herein referred to as the load rate hand, thus accomplishing the desired rate of loading which is especially important in the testing of certain more or less non-elastic materials such as lead, etc.

A further and more specific object is to provide an improved rate of loading device which is particularly applicable to hydraulic testing machines thus enabling the use of an expansible pressure tube for actuating the stress indicating hand although in certain mechanical types of testing machines using a counterpoise of translatory motion for indicating the applied stress my invention may be used in principle by providing a load rate member having a similar path of movement to that of the counterpoise and preferably parallel thereto in superimposed or closely adjacent relation. It will also be observed from the disclosure herein that my invention is applicable not only to applying of loads and stresses but also to effecting given rates of strain as by having the indicating hand actuated in accordance with strain.

82 Other objects and disadvantages will be more apparent to those skilled in the art from the following description of the accompanying drawing in which:

Fig. 1 is a diagrammatic view of a testing machine in which a test specimen is placed;

Fig. 2 is a front elevation of a stress indicating dial and hand with my improved load rate mechanism applied thereto;

Fig. 3 is a vertical transverse section taken on line 3-3 of Fig. 2;

Fig. 4 is a wiring diagram of one form of load rate motor; and

Fig. 5 is a fragmentary transverse section of a modified form of stress indicating and load rate mechanism.

In the illustrated embodiment of my invention I have shown a specimen generally indicated at 1 supported for a tension test in a hydraulic actuated testing machine generally indicated at 2, although it will be understood that this is only a diagrammatic illustration and that a specimen may be subjected to compression or other kinds of tests in any suitable testing machine wherein the applied stress or other test condition is indicated in a suitable manner, preferably by a rotatable stress indicating hand 3. In the specific embodiment of the instrument herein shown the hand is actuated by fluid pressure received in a curved expansible metal tube 4 connected to the pressure diaphragm chamber of a hydraulic type of testing machine, the outer free end of the tube being connected by a link 5 to a pivotally mounted rack 6 which actuates a pinion 7 secured to a shaft 8 of the pointer hand 3. This hand is thus rotated over the face of a graduated dial 9 in clockwise direction during increasing loads, the operating expansible tube mechanism being disposed behind dial 9.

83 A removable front glass 10 is provided with an opening preferably coaxial to shaft 8 so as to receive a suitable flanged bearing 11 journalling a shaft 12 which carries a hand 13 on the inside of glass 10. Hand 13 is driven at a constant speed or speeds, or any other predetermined variable speed if desired, by a belt 14 connecting a pulley 15 secured to shaft 12 with a pulley 16 driven by a shaft 17 projecting through an instrument panel 18 from the rear thereof. Any suitable motive power may be employed for actuating shaft 17 but in the event a constant speed is desired a watthour meter 19 may be suitably geared to shaft 17 as by a worm and gear generally indicated at 20. Should it be desired to vary the speed of the motor a variable resistance 20 may be suitably adjusted or should it be desired to obtain a wider range of speeds than possible with the rheostat than one or more of the windings 22 of the motor may be changed or omitted.

As a result of the foregoing arrangement it is seen that, if desired, a constant rate of rotation may be imparted to auxiliary hand 13 which herein is also referred to in its functional aspect as the load rate hand. To insure that a uniform rate of loading is applied to specimen 1 the operator can by merely glancing at the relatively superimposed stress indicating hand 3 and load rate hand 13, determine whether the load is being applied at the same rate as is indicated by hand 13. In the event that the load is not being applied fast enough hand 3 will lag behind hand 13 whereby the operator may adjust the testing machine controls and vice versa in case the load is being applied too fast in which case hand 3 will tend to lead hand 13, the ideal position of hand 3 being immediately below hand 13 at all times during application of the load.

It will be noted that the predetermined rate of loading is
accomplished irrespective of the deformation or
84 strain characteristics of the material under test, thus
obtaining results which are highly desirable especially in certain classes of non-ductile material.

When the test is completed and the pressure in tube 4 relieved, stress hand 3 will return counterclockwise to the zero reading but should it be desired at any time to adjust the position of load rate hand 13 the operator may grasp pulley 7 with his hand or fingers and rotate the pulley against the friction of belt 14 although it is clear that instead of having a belt driven hand it may be operated by a positive direct drive from the motor as described in connection with Fig. 5.

It is thus seen that I have provided a relatively simple arrangement for accomplishing a very desirable result which heretofore could be accomplished only by requiring an appreciable degree of skill on the part of the operator in coordinating his senses of hearing and sight, such as is the case where the metronome is used. It is further possible in my improved arrangement to apply the same to any existing testing machine equipment wherein the stress and load rate hands could have similar paths of movement and be disposed in closely adjacent or preferably superimposed relation thus allowing one indicating member to tend to overly the other member to render it more easy to determine the exactness with which the application of the load is following a given rate. This general arrangement is specifically shown herein, in one aspect of the invention, in that the two hands by both being rotatable have similar paths of movements and are in superimposed relation for direct common visible comparison at one glance of the eye.

In Fig. 5 there is shown a fragmentary transverse section of a modification of the indicating mechanism including a hollow shaft 25 for rotatably supporting a stress indicating hand 26 while the auxiliary load rate hand 27 is rotatably
supported by a shaft 28 extending through hollow
85 shaft 25 and actuated by any suitable motor 29
adapted to be driven at different constant speeds or
at a variable speed by any suitable mechanism such for example as that shown in the watthour type of motor 19. From this disclosure it is seen that the load rate hand is direct connected to the driving motor so that to manually adjust or reset the auxiliary hand, the rear end of the motor shaft may be directly manually rotated when its currents are shut off.

It will of course be understood that various changes may be made in the construction and arrangement of parts and details of design without departing from the spirit of the
invention as set forth in the appended claims.

86 I Claim:

1. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate applying load to the specimen.

2. The combination set forth in claim 1 further characterized in that said hand which is driven at a predetermined

rate of speed has provision whereby it may be manually reset.

3. The combination set forth in claim 1 further characterized in that said indicating members are in superimposed relation.

4. The combination set forth in claim 1 further characterized in that supporting means are provided for said indicating members whereby they may move in alignment with each other.

5. The combination set forth in claim 1 further characterized in that means are provided for supporting said indicating members for rotation about a common axis.

6. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a stress indicating hand, an auxiliary hand, means for rotatably supporting said hands in superimposed axial relation, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member
is adapted to be driven in response to the test load,
87 whereby the relative positions of said members
may be used to determine the rate of applying load to
the specimen.

7. The combination set forth in claim 6 further characterized in that the driving means for the auxiliary hand has provision for driving the same at a constant rate of speed.

8. The combination set forth in claim 6 further characterized in that the driving means for the auxiliary hand has provision for driving the same at different constant rates of speeds.

9. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a dial face, a hand rotatable thereover, means for actuating said hand in accordance with a condition of a test specimen, an auxiliary hand having a rotatable support disposed forwardly of said dial face, and means for driving said auxiliary hand at a predetermined rate of speed.

Drawing
of Plants
Applies

Irs 265/1

637298

17

DIV. 38

84
84.5
32

O. G. FIG. 2
CLASS 265 SUB. CLASS 1

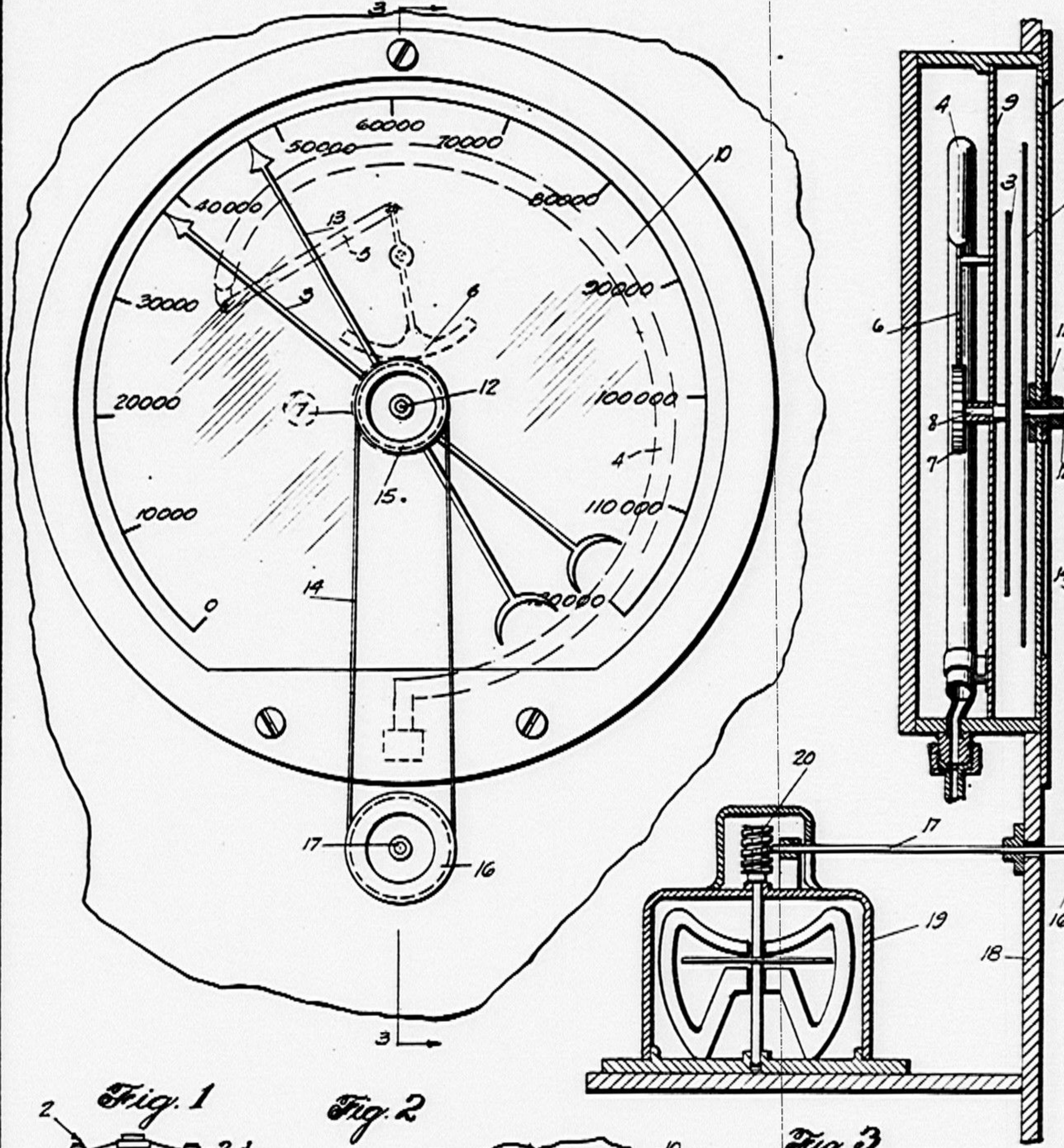
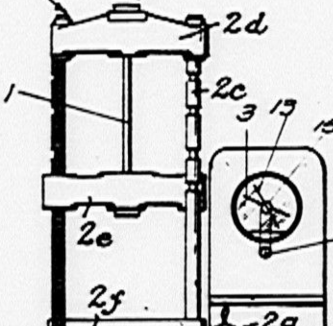


Fig. 2

Fig. 3

Fig. 1



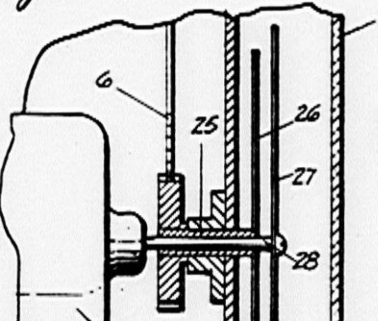


Fig. 5

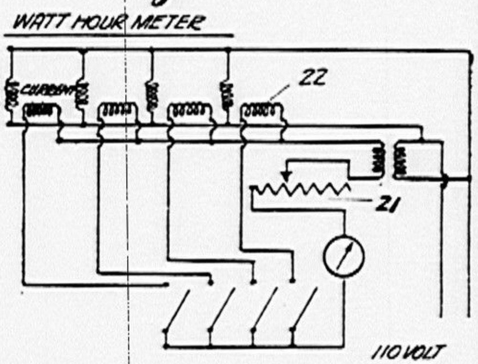


Fig. 4

INVENTOR
R. F. BLANKS

Edward ... atty.

Amendment Filed Oct. 26, 1932.

96 Please add the following claims to the above identified application:

19. In a pressure gauge for use in progressively applying fluid pressure at a desired time rate, a dial, a rotatable fluid pressure indicating hand mounted on a shaft and movable over said dial, an auxiliary hand rotatable about the same axis as said pressure indicating hand and movable over said dial, and means for driving said auxiliary hand at a constant speed.

20. In a pressure gauge for use in progressively applying fluid pressure at a desired time rate, a dial, a rotatable fluid pressure indicating hand mounted on a shaft and movable over said dial, operating mechanism for moving said hand in response to pressure changes in a line leading to said pressure gauge, an auxiliary hand rotatable about the same axis as said pressure indicating hand and movable over said dial, and means independent of the operating mechanism of the pressure indicating hand for driving said auxiliary hand at a constant speed.

22. In a pressure gauge, a dial, a rotatable pressure indicating hand movable over said dial, an auxiliary hand rotatable about the same axis as said pressure indicating hand, means for driving said auxiliary hand at a constant speed, and reset means for manually positioning said auxiliary hand.

Notice of Allowance Filed May 24, 1934.

106 Robert F. Blanks, Assor, etc.

Your Application for a patent for an Improvement in Materials Testing Equipment filed Oct. 11, 1932 has been examined and allowed with 15 claims.

Amendment Filed May 12, 1938.

112 Add the following claim:

23. The combination in an apparatus for effecting a predetermined rate of load change applied to a test specimen in a materials testing machine having opposed specimen-engaging elements one of which is moved to apply load to the specimen; comprising, a rate of load member movable at the precise predetermined rate of speed at which it is desired to apply load progressively to a specimen at each instant during a test irrespective of deformation characteristics of the specimen, means for continuously driving said member at said speed, a load indicating member movable in accordance with the actual load applied to the specimen and movable adjacent to said rate of load member in visible register therewith so long as load is actually applied to the specimen at said predetermined rate, means for actuating said load indicating member solely in accordance with the load force applied to the specimen, and adjustable means for controlling the application of load to the movable specimen engaging element of the testing machine whereby the operator may control the application of load force to the specimen and simultaneously observe whether said registered relation is being maintained.

Final Rejection by Primary Examiner Filed May 18, 1938.

116 Responsive to amendment filed May 12, 1938.

Claims 1 to 9, 19, 20, 22 and 23 are in this application.

Claims 1 to 9, 19, 20 and 22 are again rejected on the Kraus leaflet, for the reasons given in the last Office action.

Claim 23 is rejected on the Krause leaflet as applied to the claims in the preceding paragraph. This claim distinguishes over claim 1 by the positive recitation of the adjustable means, or valve, for controlling the application of load. The valve is obviously present in the leaflet, as conceded by applicant on pages 15 and 16 of paper No. 94.

Since the above rejected claims fail to avoid the previously presented grounds of rejection in any patentable respect, they are Finally Rejected in accordance with ex parte Jackson, 353 O. G. 5.

Examiner's Statement to the Board of Appeals Filed Dec. 10, 1938.

118 This is an appeal from the final rejection by the Primary Examiner of claims 1 to 9, 19, 20, 22 and 23, which constitute all the claims in this application.

The appealed claims are:

(Here follow claims 1-9 inclusive, 19, 20, 22 and 23, not reprinted here because they are identical with such claims appearing on pages 3-5 hereof)

120 The following reference was relied upon for the final rejection:

Ernst Krause leaflet (Enclosed). [See page 145]

The alleged invention relates to a testing machine provided with two indicators located for common visible comparison, one being driven by the load or stress applied to the test piece and the other being independently driven at a predetermined rate of speed, to act as a pacer for the former. By observing the pacer, the operator may increase the load applied to the test piece so that the stress indicator will coincide with that of the pacer.

The two indicators are illustrated in the drawings in the form of two hands, 3 and 13 in Fig. 1, or 26 and 27 in Fig. 5, mounted in a superimposed relation and rotatable about a common axis over a graduated dial 9. Hand 13 (or 27), constituting the pacer, is driven at constant predetermined speeds by motor 19 (or 29), and stress or load indicating hand 3 (or 26) is operated through means 4 to 7 by
121 the load applied to the specimen. Said load is effected by fluid under pressure, acting against the specimen loading means 2b and its flow regulated by manually adjustable valve 2g.

Claim 1 recites the two indicators adapted to have similar paths of movement in relatively close relation for common visible comparison, means for driving one indicator (the pacer) at a predetermined rate of speed and means driven by the test load whereby the relative position of said member may be used to determine the rate of applying load to the specimen.

Claims 2 and 22 distinguish over claim 1 by reciting that the pacer may be manually reset.

Claims 3, 6 and 7 add to claim 1 that the indicators are in superimposed relation.

Claims 4, 5 and 20 add to claim 1 that the supporting means for the indicators are rotated about a common axis.

Claim 8 differentiates from claim 1 in that the pacer may be driven at different rates of speeds.

Claims 9 and 19 add to claim 1 the face dial.

Claim 23 recites, in addition to the subject matter of claim 1, adjustable means for controlling the application of load to the specimen load applying means.

The Krause leaflet, cited in interference No. 69,554 against claim 1 of this application, and its sufficiency upheld by the Board of Appeals in its interlocutory decision of February 15, 1938, discloses a testing machine including the following elements of structure, reference characters having been applied by the Examiner for clearness: Relatively movable specimen clamps (L and M), fluid means for applying load to one of said clamps, manually adjustable 122 valve K for varying the flow of the load applying fluid, a dial A, two indicators D and F rotatable over the dial in a superimposed relation and about a common axis, one being actuated by the load applied to the specimen and the other driven at predetermined constant speeds to act as a pacer for the former. The pacer is driven by an adjustable clock mechanism, as described in the affidavit of Fritz Tengg, pages 2 and 3 of the translated copies, found in the aforesaid interference file. The adjustability of the clock is also set forth in the first page of Krause, which recites, "Testing-speeds can be regulated according to standard specifications" and "minutest regulation of testing speed". The proper rate of load is applied to the specimen by adjusting valve K until the load indicator rotates in unison with the pacer. A clearer and a magnified showing of Krause will be found in the original copies and the prints, respectively, in said interference file.

All the claims stand finally rejected as unpatentable over the Krause leaflet, for the reasons found in papers Nos. 40, 91 and 97 of said Interference File No. 69,554. In line with the record in said interference, claims 1, 3 to 9, 19, 20 and 23 have been finally rejected as fully met by Krause. Taking claim 6 as typical of this group, it is met by the Krause leaflet, as follows, using the reference characters above referred to:

An apparatus for determining a predetermined rate of load change applied to a test specimen T in a materials testing machine, comprising a stress indicating hand F, an auxiliary hand D, rotatably supported in superimposed axial relation, clock means for driving said auxiliary hand at a predetermined rate of speed, and means whereby the stress indicating hand is adapted to be driven in response to the
test load, whereby the relative positions of said
123 hands may be used to determine the rate of applying
load to the specimen.

(The last two means are recited in the above description of Krause and in the affidavit of Fritz Tengg, referred to therein.)

Claims 2 and 22, which distinguish over the preceding group by reciting that the pacer may be reset, have been rejected as unpatentable over Krause. While the Krause leaflet does not state that the pacer hand is resettable, it is common knowledge that practically all clock mechanisms are provided with resetting means. It is also obvious that Krause contemplated the use of such means, otherwise his apparatus would not be capable of performing more than one test.

Respectfully submitted,

A. D. McFadyen,
Examiner, Div. 36.

Decision of Board of Appeals Dated June 16, 1939.

163 This is an ex parte appeal on the question of patentability. This question was considered by us in an inter partes appeal. The claims rejected are: 1-9, 19, 20, 22 and 23.

The reference relied upon by the Examiner is the leaflet published by Ernst Krause & Co.

As to the claim which was before us previously, we can see no reason for modifying our decision and it is therefore repeated and is as follows:

"This is an appeal by the party Blanks from the decision of the Primary Examiner granting a motion to dissolve the interference.

"The count reads as follows:

1. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate of applying load to the specimen. 164

"The subject matter relates to testing apparatus having a clock located adjacent the dial of the apparatus so as to determine the rate of applying the load, and the question before us is whether a foreign publication can be relied upon for rejecting the count. It would only encumber the record to set forth in detail the party Blanks' arguments as to the insufficiency of the disclosure of the publication. We have carefully considered his reasons but it is our opinion that even if that publication may be generic to various clock arrangements which would not satisfy the count, the employment of a clock in which the pointer moves in the same direction as the pointer of the testing machine and over substantially the same path would be an obvious, and probably the most obvious one. We are satisfied, therefore, that the subject matter of the count does not involve invention over the disclosure of the publication.

"The party Blanks also argues that the date of the publication has not been sufficiently proved, particularly in view of an affidavit which indicates that a publication was printed after the time that other affiants stated that a publication was seen. All of the dates are sufficiently early so as to anticipate the application involved in this interference and inasmuch as the publications have different numbers on them, it is clear that they are not the same. We believe that the apparent discrepancy is one which could be explained and we do not consider that it sufficiently discredits the affidavits so that the dates set forth therein cannot be relied upon.

"The party Blanks moves to expunge certain papers from the record and while we do not rely upon this matter in arriving at our decision, we do not feel justified in directing that it be removed. The question under consideration is whether a patent shall be granted and we do not consider it unreasonable to leave in the record any matter which may be useful in the future in reaching a clearer understanding of the state of the prior art, even if that matter is not relied upon at this time.

"The decision of the Primary Examiner is affirmed."

With the exception of claim 23, we do not discover any reason for adding any discussion to our inter partes decision. That claim reads as follows:

23. The combination in an apparatus for effecting a predetermined rate of load change applied to a test
165 specimen in a materials testing machine having opposed specimen-engaging elements one of which is moved to apply load to the specimen; comprising, a rate of load member movable at the precise predetermined rate of speed at which it is desired to apply load progressively to a specimen at each instant during a test irrespective of defor-

mation characteristics of the specimen, means for continuously driving said member at said speed, a load indicating member movable in accordance with the actual load applied to the specimen and movable adjacent to said rate of load member in visible register therewith so long as load is actually applied to the specimen at said predetermined rate, means for actuating said load indicating member solely in accordance with the load force applied to the specimen, and adjustable means for controlling the application of load to the movable specimen engaging element of the testing machine whereby the operator may control the application of load force to the specimen and simultaneously observe whether said registered relation is being maintained.

It will be noted that this claim specifies:

> "a rate of load member movable at the precise predetermined rate of speed at which it is desired to apply load progressively to a specimen * * *."

We believe that an ordinary time clock probably could not be set to move at any rate of speed which it would be desired to apply load to specimens. A question therefore arises as to what interpretation shall be given to the term "clock" in the reference.

In the second paragraph of page 1 of the original specification of this application is found the following statement:

> "In studying stress and strain characteristics of materials it has heretofore been attempted in certain classes of tests to apply a load to the specimen at a constant rate as by having the operator listen to a metronome and then manipulating the testing machine controls in an attempt to have the stress indicating hand move in timed relation to the beats of the metronome."

We believe that the obvious meaning of this statement is
that the metronome would be set so that its beats
166 would correspond to the precise predetermined rate
of speed to which it is desired to apply load progres-
sively to a specimen. With this prior art in mind, we con-

sider that in the reference where "a clock" is mentioned, an ordinary time clock is not suggested but one which can be adjusted to run at the speeds of a metronome, or, in other words, one which would satisfy the particular limitation in claim 23 which is under consideration. It is believed that to place an ordinary time clock, with its hand in the manner stated in the reference, would be substantially useless and would not be as practical as listening to the beats of a metronome which had been timed to the desired speed. We consider, therefore, that the reference is pertinent even as to claim 23.

The decision of the examiner is affirmed.

INTERFERENCE 69,554.

DECISION OF EXAMINER OF INTERFERENCES DATED JULY 30, 1935, DENYING MOTION TO DISSOLVE.

172 This is a motion to dissolve the interference, the following being the contested count:

1. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate of applying load to the specimen.

The motion to dissolve this interference on the single count thereof as made by the party Lewis was heard before the Primary Examiner on June 26, 1935, the counsel of record for each of the contestants appearing.

The interference involves a testing machine having two indicating hands having similar paths of movement in relatively close relation for purposes of common visible comparison. One of the indicating hands is driven at a predetermined rate of speed, to act as a pacer for the other hand, which moves in response to the test load. Therefore if the test load be applied so as to have the load hand keep with the pacer hand, the test load will increase progressively corresponding to movement of the pacer hand.

The ground of the motion of the party Lewis is that the count is anticipated by a printed prospectus issued
173 by the Ernst Krause Co. of Austria, in 1930. The prospectus is proven by a signed declaration "in lieu of an oath" by the officials of the Krause Co., that copies of such prospectus were sent to their clientele at random prior to Oct. 11, 1930. The signatures of the Krause Co. officials are attested "as genuine", by a notary, but the attestation in no way indicates that the declaration was made with sanctity equivalent to an oath. In other words the officials of the Krause Co. apparently simply make a statement or declaration and their signatures have been verified by a notary.

The prospectus discloses a hydraulic testing machine including a base upon which is mounted an upstanding frame for the fixed and movable clamps for the specimen. A piston actuates the movable clamp or head, and a conduit is shown leading to the piston chamber. There is also shown a large dial having two pointers, which the party Lewis alleges to respond to the two pointers of the count. The following is a translation of the matter bearing upon these pointers:

"To regulate a certain test velocity, a clock built into the pendulum manometer is used, whose hand is located concentrically to the manometer hand."

Now a manometer being but a pressure gage, a pendulum manometer, though not common, would seem to be a pressure gage in which the force is transmitted to a pendulum, in which case the pointer could move with or about the pendulum pivot. A weight is seen to the right of the dial, apparently adjustable along the pendulum arm. The clock

mechanism is not shown, leaving it uncertain whether the clock is a spring driven type, or whether the electric motor shown just below the dial drives the recorder chart
174 and the "clock" hand. It should be noted also that the hands are somewhat widely spaced.

The party Blanks opposes the motion on three grounds, to wit: (I) That the motion is improper; (II) that the date and publication of the prospectus relied upon by Lewis as anticipatory has not been properly proved; and (III) that the prospectus if admitted is too vague to anticipate the count. These points will now be considered seriatim:

I. Blanks' contention that the motion to dissolve is improper because based on an ex parte affidavit is denied. The decisions cited by Blanks deal with affidavits going to the merits of the inventions, such as operativeness of the devices of the parties or references, whereas here the prospectus alone is introduced without explanations of what the device discloses therein does or how it does it. The prospectus is introduced as a publication and the trend of the affidavit is merely to establish its date. The situation is in every respect like the case where a foreign patent is cited with an accompanying certificate from the foreign office. Such certificate is an affidavit as much as the attempted proof of the prospectus. They differ in quality but not in kind.

In the Horton v. Leonard case the Commissioner qualified admittance of affidavits (page 85) "I am convinced that motions to dissolve alleging inoperativeness,—based on affidavits—should not be transmitted—".

Now the prospectus has been introduced to settle a preliminary question, to wit; whether there is in fact any proper interference, for there can be no proper interference where there is a known publication constituting a statutory bar. Such a statutory bar is a jurisdictional question and may be raised at any time. Simstrand vs. Gubelman,
175 1925 C. D. 235. It is the question of a statutory bar, not the evidence, which is now before the Examiner for decision, and as was indicated at the hearing the Exam-

iner may avail himself of any information which he may obtain throwing light on the question.

II. Blank's opposition to the prospectus as an anticipatory publication on the ground that the prospectus has not been properly established and proved is sustained. The prospectus bears no date. If accepted at all it must be taken upon its bare face as established solely by a signed statement of the officers of the Krause Co., that it was printed prior to October 11, 1930 and distributed to their clientele. In the opinion of the Examiner such a statement, not made under oath, can not be held to establish bars arising in a foreign country. In the first place the foreign parties are not subject to the laws of this country as to perjury to say nothing of simple declarations, and this procedure would open the doors to fraud which might in instances nullify the intent of the patent laws to promote progress in this country. A fair proof of the prospectus should have been made under oath, corroborated by recipients of the prospectus, etc.

This office possesses facilities however for investigating and proving the facts as to the prospectus, but it is not deemed necessary to proceed in such way in view of the fact that the Examiner does not consider the prospectus as anticipatory as will be explained in connection with Blanks third contention.

III. Blanks' contention that the prospectus is too vague to anticipate the count is sustained. The count is rather specific, though calling for few elements. The pacer
176 hand and force hand must be contiguous for easy
comparison—as the count reads, these hands must "have similar paths of movement in *relatively close relation* for purposes of common visibility comparison". The claim does not respond to a clock in one place and a force hand nearby, for it had been old long prior to this invention to time a force application by means of a stop watch, or by listening to the ticks of a metronome; it had also been common to compare speeds by registering pointers. The essential novelty of the count comprises the concept of applying

a *force* in a test by keeping a *force* hand substantially registered with a pacer (*time*) hand. Now the two hands in the prospectus are shown so far apart as to negative the contiguous relation and pacing concept above referred to. At best the prospectus may be said to include a clock, but not in the relation to the force hand covered by the count—rather it is related to the force hand as was the metronome or stop watch of earlier practice.

A foreign publication, to be anticipatory, must clearly and exactly set forth the anticipating structure. It is not sufficient that a speculative interpretation thereof, assisted by knowledge of later inventions, and the assistance of a skilled mechanic, might arrive at the invention. The publication must be reasonably clear on its face. The Examiner is unable to find such clarity and definiteness in the prospectus as to anticipate the count. It is true the prospectus states that the apparatus includes a built in clock, 177 but in view of the lack of detailed disclosure this matter is regarded as nothing more than general desiderata. It is repeated that the count calls for more than a clock or clock hand and a force hand. The time or pacer hands must have similar paths and a relative speed for a given test so that the force hand may be contiguous for comparison. This is not taught by the prospectus.

The motion to dissolve by the party Lewis is therefore denied.

No appeal permitted. Rule 124.

Decision of Examiner of Interferences on Petition for Rehearing, Dated January 6, 1936.

178 The party Lewis filed on August 14, 1935 a "petition for rehearing" from the adverse decision of the Primary Examiner regarding his motion to dissolve. On Sept. 10, 1935 the parties were advised that said petition would be treated simply as a petition for *reconsideration,* but decision on the merits thereof was deferred to permit the party Lewis to submit further proof of the date and fact

of publication of the leaflet of the Krause Company, of Austria, upon which the motion was predicated. The party Lewis has now filed affidavits of several parties relative to the fact and date of publication of the Krause leaflet.

The questions now for decision involve:

(I) The merits of the original motion in view of the facts set out in petition for reconsideration regarding the disclosure of the Krause leaflet; and

(2) The matter of proof of the fact and date of publication of the Krause leaflet. These questions will be considered seriatim:

1. Reconsideration of motion to dissolve.

It might be stated that at the time of the decision of July 30, 1935, the Primary Examiner and his assistant 179 were both new to the art involved. The Examiner has since taken occasion to familiarize himself with the art in detail, as by a thorough inspection of the hydraulic testing apparatus used in the United States Bureau of Standards antedating either party to this interference, perusal of test books, and prior patents bearing thereon, etc. As a result of this study, through which the Examiner has obtained the facts known to those "skilled in the art", the Examiner is convinced that his original decision denying the motion by Lewis to dissolve in view of the Krause leaflet was in error, as will be pointed out below.

It might be further stated that the Examiner at the time of writing his original decision was under no misconception as to what a "pendulum manometer" is basically, (bottom of page 2 of his decision having reference to the type shown by Davis, 47,936, back in 1865). The Examiner, however, admittedly was ignorant of the details of the particular type of dynamometer disclosed by the Krause leaflet, and was misled as to what part actually was the pendulum, believing it the "weight—seen to the right of the dial" (see page 2, line 5 from bottom of decision). A recent visit to the Bureau of Standard where the Examiner could see the old Krause type of testing machine in operation, with its long pendulum arm, at once revealed the fundamental error upon which the Examiner's decision was based; to wit, what part was the pendulum? The small adjustable weight to the right of the dial, if considered the pendulum arm, as in the view then taken, apparently would give its indications on the small dial-like area to the upper right of the main dial; which erroneously considered construction would not meet the count, as the Examiner stated, for "The claim does not respond to a clock in one place and a force hand nearby".

(Page 5, line 4 of decision).

180 As was above stated, an inspection of conventional apparatus at the Bureau of Standards would readily show that the part marked ("W" in red) in the Lewis petition for reconsideration is the pendulum arm, and the part marked F the dial for the pendulum. This also would have been readily apparent had the Examiner been aware of the disclosure of figs 54- to 56 of the Amsler apparatus and the description thereof, on pages 68-69 of Batson & Hyde's treatise on "Mechanical Testing" (1922) cited in the Lewis brief. This text-book further shows the error the Examiner fell into as to the function of the small electric motor of the leaflet, which the Examiner originally thought to drive the recorder, etc.

There can be no doubt to one familiar with the Batson and Hyde test above referred to or with the apparatus of the Bureau of Standards but that in the Krause leaflet the large inclined arm protruding from beneath the dial is the pendulum arm, and that its movement is manifested by one of the pointers on the large dial shown. There remains, therefore, to consider the disclosure of the pacer hand.

The Krause leaflet discloses two hands traversing the dial. One, the Examiner is now convinced is the manometer or force hand. What is the other hand for? The Krause leaflet contained the statement: "To regulate a certain test velocity (or for adjusting a certain testing speed), a clock built into the pendulum manometer is used, whose hand is located *concentrically* to the manometer". There being only one hand disclosed beside the manometer hand, the other hand must be the clock hand. This clock hand is shown *concentric* with the manometer hand.

We have then, a clock hand concentric with the manometer
hand. What is its purpose? The leaflet states it
181 is "To regulate testing speed", in other words, a
pacer hand. On the front page of the leaflet, it is
announced that the apparatus affords "minutest regulation of testing speed"; "Testing speeds can be regulated according to standard specification" etc. This can logically or reasonably refer to nothing but the clock hand. Obviously the term "clock" is but generic to timing means, otherwise the testing *speed* could not be adjusted.

The Examiner's former inference from his observation that the two hands are shown separated is deemed erroneous, and is withdrawn. In the picture the attendant has simply stepped back to show the entire apparatus, and the pacer hand has advanced normally, while the force hand is stationary because the attendant has released the force applying hand valve. As Lewis points out, this relative position of the force and pacer hands is necessary to a clear picture of the two hands, and this expedient has been adopted by both parties to this interference in making their patent application drawings.

There is a clock or timer including a pacer hand associated with the force or manometer hand of the Krause leaflet. The details of its construction may take many forms, and one form or another would be obvious to any mechanic. Answering Blanks' argument, page 2, first paragraph, the details are immaterial for the count includes simply the two hands (manometer and pacer) and means for driving the pacer hand at a predetermined rate. If the clock hand moved at a simple clock speed it still responds to the count ("predetermined rate"). Any mechanic could put
in the pacer drive. In fact within the language of the
182 count, the pacer hand may be simply set up in front

of the old machines to move adjacent the manometer hand and driven by a belt, as now practiced at the United States Bureau of Standards, and requires no structure worth mentioning. The concept being fairly given, the installation is obvious.

The Examiner therefore considers the Krause leaflet as a fair and clear disclosure to anyone skilled in the art of the subject matter of the interference count.

In reaching the above decision, as well as the original decision, the blue print or mechanical drawing filed with the original affidavit and Krause leaflet has not been considered. The original affidavit did not allege that the mechanical drawing was distributed with the leaflets, nor have the officials of the Krause Company as yet made such allegation, tho the affiant Gadolla of the Graz Railroad—Factory alleges in his affidavit that "an exact copy of the—attached plan (which is the same plan as the blue print and that accompanying the new Krause affidavits) was also sent to the firm of Graz - - - concerning the offer". The mechanical drawing has not, therefore, been established as a part of the publication, distributed freely accompanying the leaflet. The mechanical drawing is deemed but evidence of prior knowledge or use abroad, which will not defeat a patent in this country, Rule 27.

In reaching this decision the Examiner has ignored also the matter about "clock-work for the testing speed" and the translations thereof stated to be from the original text published by the Krause Co., for the reasons stated in the decision of the Commissioner herein. If this matter were distributed with the leaflet, or in itself comprised
183 a publication, an original copy thereof should have
been presented and the fact and date of publication established by the usual proofs. It need hardly be added that were the mechanical drawing and the said descriptive matter about the clockwork established as complementary publications, and of the necessary date, the two would literally and conclusively anticipate the count.

Also the exhibits presented in Lewis' petition for reconsideration purporting to be publications of the Amsler Company have not been considered. Nothing, in short, has been considered by the Examiner save prior patents, the Batson & Hyde text, all officially antedating both contestants; and the apparatus of the U. S. Bureau of Standards verified as far antedating either party, etc., to which the Examiner has resorted to fully acquaint himself with the art as known to one skilled therein.

The motion to dissolve by the party Lewis is sustained, subject to final decision on point (II) below:

II. Proof of fact and Date of Publication of Krause Leaflet.

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In the original decision the Examiner held the Krause publication insufficiently established, and the moving party Lewis has filed what he considers complete proof of the fact and date of publication in the form of affidavits of six persons, with an offer to produce the several affiants for cross examination at their respective residences.

In the affidavits by Otto Volter, Vice President of the Krause Company and Curt Pleger, another official thereof, they identify the Krause leaflet as a copy of “a circular mailed at random to its customers prior to the eleventh of October 19, 1930”.

184 The “copy” annexed to these affidavits is in English whereas there was attached to their original affidavits a “copy” of the leaflet in German; the original affidavit was also accompanied by an English copy to facilitate consideration by this Office. Both “copies” contain the same illustrations and are literally alike save for the language in which printed. Since the affiants Volter and Pleger are the same in both the original and the new affidavits of the Krause Company it is clear that the Krause Company supplied the leaflet in the language of the particular patron, and in attaching the English copy to their new affidavit they had in mind facilitating the work of this

Office. The Krause Company has established by the original and new affidavits taken together that the leaflet was distributed in both German and English language prior to October 11, 1930. The same original affidavit was held insufficiently proved because not "corroborated by recipients of the prospectus". The corroborating affidavits of recipients of the leaflets identify and attach German copies of the leaflet, which may be taken in connection with the original Krause Company affidavits, or both the old and new. The party Blanks can include this point in his cross-examination if he so desire.

Eugen Gadolla, engineer with the Graz Railroad Car and Machine Factory, which purchased one of the apparatus, identifies a copy of the Krause leaflet which is an exact duplicate of that attached to the original Krause affidavit and affirms that such copy was "available as a basis for the offer made, and that its illustrations agree in their nature with the machine delivered" on Sept. 27, 1929.

Alfred Nitsch, technical counsel of the firm of Elin, in Weiz, identifies an attached photostatic copy of the Krause leaflet originally filed and affirms it was sent by the Krause Company to his firm prior to Oct. 11, 1930.

185 Joseph Gosch, shop assistant to the firm of Eilin, identifies an attached photostatic copy of the Krause leaflet and affirms it was sent by the Krause Company to his firm prior to Oct. 11, 1930.

Fritz Tengg, plant assistant in Eisenwarenfabriken Lapp-Finze, identifies a duplicate copy of the Krause leaflet originally filed herein and states upon taking up his duties in July 1930 he found in their shop a Krause machine corresponding to the leaflet, and "in the files—directions for putting into operation and operating the—machine". This affidavit is regarded as ineffectual because affiant does not say it was *a copy of the Krause leaflet* submitted as anticipatory which was available "in the files". The directions may have been something entirely different.

Ignoring the affidavit of Tengg, in the opinion of the Examiner the other affidavits appear to make out a case of publication of the leaflet prior to the filing date of the contestants. Two officers of the Krause Company testify the leaflet was distributed at random to their clientele, and two different patrons of the Krause Company testify to receiving and possessing copies of the leaflet. This appears to be sufficient publication to make a patent reference. The affidavits would seem to fairly establish the fact and date of publication of the Krause Company leaflet, in the absence of any error in the foregoing interpretation of them or unless the affidavits be impeached by the party Blanks by cross-examination of the affiants or otherwise.

The party Lewis has offered to produce the affiants for cross-examination at their respective residences abroad. In view of the difficulties involved in setting a time and place agreeable to the contestants and affiants, the Examiner is of the opinion that a satisfactory appointment
186 can be reached by stipulation of counsel for each party, both of whom are located in Philadelphia and known to each other. To this end the Examiner sets a period of 30 days in which the counsel for the parties may file stipulations as to time and place for producing the witnesses, and/or in which the party Blanks may state his views concerning the affidavits above discussed.

A. D. McFadyen,
Examiner, Div. 36.

DEPOSITIONS TAKEN IN INTERFERENCE 69554.

214 Federal State of Austria,
City of Vienna,
Consulate General of the United States of America, ss:

Depositions

of sundry witnesses, taken before me, Reed Paige Clark, Consul of the United States of America, at Vienna, Austria, under and by virtue of a Commission issued out of the Department of Commerce, United States Patent Office, in the matter of an interference proceeding now pending in the United States Patent Office between Robert B. Lewis and Robert F. Blanks, No. 69,554, for Speed Comparing Device.

It appearing that the witnesses could not intelligently testify in the English language and did well understand the German language, one Martha Junkermann, who well understands the English and German languages, was employed as interpreter and was duly sworn, and said Martha Junkermann interpreted accordingly.

The answers of the witnesses to the interrogatories and cross interrogatories were taken down stenographically by the said Martha Junkermann and were then transcribed by her under my direction, and the said transcripts being then read over correctly to the several witnesses by me were then signed by the said witnesses in my presence.

The answers of each witness follow the respective interrogatories and cross interrogatories as follows:

Interrogatories Propounded to and Answers of Eugen Gadolla

Q. 1. Please state your name, age, residence and occupation? A. Engineer Eugen Gadolla, of Vienna, Head Engineer and duly authorized Civil Engineer.

Q. 2. How long have you been in the service of Graz Railroad Car and Machine Factory, Joint Stock Company, formerly Joh. Weitzer? A. Since September 1, 1922. I am now employed in Vienna with the Simmeringer Waggonfabrik, which was fusioned with the Grazer Waggonfabrik.

Q. 3. Where is this firm located? A. The Management of the firm is in Vienna, but there is one plant in Vienna and one in Graz.

Q. 4. I now hand you a printed circular, marked Exhibit A, and ask you to state whether or not you recognize it and if so state what it is and what you know about it? A. I know this printed circular. It is the prospectus for a testing machine produced by the firm of Ernst Krause & Co., equipped with a pendulum manometer with clock work.

Q. 5. When did you first see this circular, Exhibit A? A. In the winter of 1929.

Q. 6. How do you fix the time as prior to October 11, 1930? A. I can fix the time because we ordered the same machine on July 25, 1939, and the machine was received by us in September 1929.

Q. 7. Can you produce any of these vouchers which you have referred to? A. I can also submit the invoice for this machine (Exhibit B), and a sketch of the same machine which, on December 28, 1928, was made by the firm of Ernst Krause (Exhibit C). I am furthermore, submitting a prospectus book in which this machine is described on pages 14 and 15 (Exhibit D) and Instructions for the working of the Material Testing Machine with Pendulum Manometer, Model IV, (Exhibit E), on pages 7 and 8 of which the clock work of the pendulum manometer is described. (193, 200, 215)

Cross Interrogatories Propounded to and Answers of Eugen Gadolla

Q. 1. Can you produce the actual copy of the circular (corresponding to Exhibit "A") that you saw prior to October 11, 1930? A. Yes.

Q. 2. If you can produce it, will you please do so? A. I am submitting it herewith as Exhibit F. (200, 216)

Interrogatories Propounded to and Answers of Alfred Nitsch

Q. 1. Please state your name, age, residence and occupation? A. Alfred Nitsch, 33, residing at Weiz, Styria, Workshop Assistant.

Q. 2. How long have you been in the service of "Elin" Aktiengesellschaft fur elektrische Industrie? A. Since December 1, 1927.

Q. 3. Where is this firm located? A. In Weiz.

Q. 4. I now hand you a printed circular, marked Exhibit A, and ask you to state whether or not you recognize it and if so state what it is and what you know about it? A. Yes, I know it. This is a circular of the firm of Ernst Krause & Co. concerning a testing machine which was delivered to the firm of "Elin" on April 30, 1930.

Q. 5. When did you first see this circular, Exhibit A. A. It was in January or February, 1930, at the latest.

Q. 6. How do you fix the time as prior to October 11, 1930? A. The machine was delivered to us at the end of April 1930, and I recall distinctly having had in hands this circular some time prior to the receipt of the machine. The order issued by our firm was dated March 6, 1930, and the date of the invoice from Ernst Krause was dated April 28, 1930. (194, 217)

Cross Interrogatories Propounded to and Answers of Alfred Nitsch

Q. 1. Can you produce the actual copy of the circular (corresponding to Exhibit "A") that you saw prior to October 11, 1930? A. Yes.

Q. 2. If you can produce it, will you please do so? A. I am submitting the circular here with (Exhibit G). (201, 217)

Interrogatories Propounded to and Answers of Josef Gosch

Q. 1. Please state your name, age, residence and occupation? A. Josef Gosch, 36, Weiz, Styria, Workshop Assistant.

Q. 2. How long have you been in the service of "Elin" Aktiengesellschaft fur elektrische Industrie? A. Since May 21, 1921.

Q. 3. Where is this firm located? A. In Weiz, Styria.

Q. 4. I now hand you a printed circular, marked Exhibit A, and ask you to state whether or not you recognize it and if so state what it is and what you know about it? A. It is the same circular we received in January or February 1930, covering a testing machine.

Q. 5. When did you first see this circular, Exhibit A? A. It may have been in February 1930.

Q. 6. How do you fix the time as prior to October 11, 1930? A. We first studied the circular and then, on April 30, 1930, we received the machine. (194, 218)

Cross Interrogatories Propounded to and Answers of Josef Gosch

Q. 1. Can you produce the actual copy of the circular (corresponding to Exhibit "A") that you saw prior to October 11, 1930? A. It is the same circular which has been submitted by Mr. Nitsch (Exhibit G). We are employed in the same firm.

Q. 2. If you can produce it, will you please do so? A. (Not answered). (201, 218)

Interrogatories Propounded to and Answers of Curt Pleger

Q. 1. Please state your name, age, residence and occupation? A. Curt Pleger, 40, Vienna, Manager at the firm of Ernst Krause & Co.

Q. 2. How long have you been connected with the firm of Ernst Krause & Co., A. G.? A. Since March, 1920.

Q. 3. Where is this firm located. A. At 151 Engerthstrasse, Vienna XX.

Q. 4. I now hand you a printed circular, Exhibit A, and ask you to state whether or not you recognize it and if so explain what it is? A. Yes. I recognize it. It is a circular regarding a material testing machine which is being produced in our factory.

Q. 5. Do you know when this circular, Exhibit A, was prepared and printed? A. This circular, Exhibit A, was prepared and printed in the first half of 1930.

Q. 6. When was it? A. On July 15, 1930, it was delivered by the printer.

Q. 7. How do you fix this time as prior to October 11, 1930. A. Proof for this date is the invoice of the printer dated July 15, 1930. The name and address of the printer was Stefan Szabo, 1 Leopoldsgasse, Vienna II.

Q. 8. What was done with this circular after it was printed? A. A large portion thereof was sent to interested parties.

Q. 9. When did the distribution of this circular, Exhibit A, take place? A. In the course of the months following July, 1930.

Q. 10. How do you fix this time as prior to October 11, 1930? A. I picked out, as an example, one case only, concerning an offer to J. M. Voith, of St. Poelten, Lower Austria, made on Sep. 30, 1930.

Q. 11. Please state, if possible, the names of some of the customers to whom this circular (Exhibit A) was sent? A. The firms of Lapp-Finze, at Graz, Styria; Tatrawerke, in Nessellsdorf (Czechoslovakia); "Elin" A. G., in Weiz, Styria; Grazer Waggonfabrik, in Graz, and others. (193, 200)

Cross Interrogatories Propounded to and Answers of Curt Pleger

Q. 1. Approximately how many copies of the circular corresponding to Exhibit "A" were sent to prospective customers prior to October 11, 1930? A. About one hundred.

Q. 2. Was the actual physical copy of the circular constituting Exhibit "A" sent to a customer, or did you send other copies of Exhibit "A"? A. An actual physical copy was sent to each customer. (200, 220)

* * * * * * * * * *

215 Engineer Eugen Gadolla, of Vienna, Head Engineer and duly authorized Civil Engineer.

Since September 1, 1922. I am now employed in Vienna with the Simmeringer Waggonfabrik, which was fusioned with the Grazer Waggonfabrik.

The Management of the firm is in Vienna, but there is one plant in Vienna and one in Graz.

I know this printed circular. It is the prospectus for a testing machine produced by the firm of Ernst Krause &

Co., equipped with a pendulum manometer with clock work. In the winter of 1929.

I can fix the time because we ordered the same machine on July 25, 1929, and the machine was received by us in September 1929.

I can also submit the invoice for this machine (Exhibit B), and a sketch of the same machine which, on December 28, 1928, was made by the firm of Ernst Krause (Exhibit C). I am, furthermore, submitting a prospectus book 216 in which this machine is described on pages 14 and 15 (Exhibit D) and Instructions for the working of the Material Testing Machine with Pendulum Manometer, Model IV, (Exhibit E), on pages 7 and 8 of which the clock work of the pendulum manometer is described.

221 Federal State of Austria }
City of Vienna } SS.
Consulate General of the }
United States of America }

I, Reed Paige Clark, Consul of the United States of America, in and for the Consular district of Vienna, Austria, the Commissioner acting under the annexed Commission, being a duly authorized officer of the United States at Vienna, do hereby certify that, in pursuance of said Commission, I severally examined Messrs. Eugen Gadolla, Alfred Nitsch, Josef Gosch and Curt Pleger at my office at Vienna, Austria, on the sixteenth day of February, 1937, at 10:30 a. m., and that the said witnesses being to me personally known and known to me to be the same persons named and described in the interrogatories, cross interrogatories and Commission annexed, being by me first severally sworn to testify the truth, the whole truth, and nothing but the truth in answer to the interrogaories and cross interrogatories in the cause in which the annexed Commission is issued, their evidence was taken down by and written out in my presence by Martha Junkermann, as aforesaid, and, after being read over and accepted by them respectively, was subscribed by them respectively in my presence; and I further certify that Dr. Josef Hess, of Vienna, was present as attorney for Robert B. Lewis, and that no one was present in behalf of Robert F. Blanks; and I further certify that I am not connected, by blood or marriage, with either of the parties nor interested, directly or indirectly, in the matter in controversy.

222 In WITNESS WHEREOF, I have hereunto set my hand and seal of office at Vienna, Austria, this 18th day of February, 1937.

REED PAIGE CLARK
Consul of the United States of America
Acting as Commissioner.

* * * * * * * * * *

Unsere hydraulische Universal-Material-Prüf- und Zerreißmaschine Modell MP 4

ist nach dem Prinzip der hydraulischen Pressen mit liderungsfreiem Kolben gebaut. Die Kraftbestimmung erfolgt durch Pendel-Manometer. — Die Maschine kann bis 40.000 kg bei Druck- und Zugproben beansprucht werden. Sie besteht im wesentlichen aus einer Pumpe, einem Preßzylinder, dem Pendel-Manometer zum **direkten** Ablesen der Belastung und den Kraftübertragungsorganen.

Der **Preßzylinder** ist aus hochwertigem, besonders dichtem Spezialstahlguß angefertigt.

Preßkolben und Zylinder sind geschliffen. Der Kolben besitzt sonst keinerlei Abdichtung als den sich zwischen den Wandungen bildenden Ölfilm, so daß nur reine Flüssigkeitsreibung auftritt. Dieser Reibungswert der bei allen Drücken konstant und verschwindend klein ist, wird schon in unserem Werk bei der Eichung der Maschine völlig ausgeglichen.

Der **Pumpenkörper** ist aus dem vollen Stahl hergestellt. Als Druckflüssigkeit dient ein gutes harz- und säurefreies Mineralöl.

Kraftablesung. Zum Ablesen der ausgeübten Kraft dient ein Pendelmanometer mit den drei Meßbereichen von 0 bis 4.000 kg, 0 bis 12.000 kg und 0 bis 40.000 kg. Da dieses Pendelmanometer keiner Abnützung unterworfen ist, oder durch Überbeanspruchung gefährdete Teile enthält, bleibt die Richtigkeit der Kraftablesung auch nach längster Betriebsdauer gewahrt.

Zur Einstellung einer bestimmten Prüfgeschwindigkeit (nach den Übernahmsbestimmungen der Deutschen Reichsbahn) dient eine in das Pendelmanometer eingebaute Uhr, deren Zeiger konzentrisch zu den Manometerzeigern angeordnet ist.

Diagrammschreibvorrichtung. Mit dem Pendelmanometer fest verbunden ist eine Diagrammschreibvorrichtung, die es gestattet, den Kraftverlauf in Abhängigkeit von der Dehnung graphisch festzulegen (Zerreißdiagramm).

Handbetrieb. Bei Maschinen mit Handbetrieb ermöglicht ein Kolben mit veränderlichem wirksamen Querschnitt rasches Zurücklegen toter Wege vor Versuchsbeginn, da der Maschinenkolben pro Hub des großen Pumpenkolbens um etwa 4 mm gehoben wird. Beim Arbeiten mit dem kleinen Pumpenkolben, also während des eigentlichen Versuches, beträgt der Weg des Maschinenkolbens 0.4 mm pro Hub.

Elektrischer Antrieb. Wird die Ausrüstung der Maschine mit elektrischem Antrieb gewünscht, so wird im Kastenfuß ein Schneckengetriebe eingebaut. Der Motor wird auf einer am Sockel der Maschine schwenkbar befestigten Motorspannplatte angebracht, so daß außer dem reinen Gewicht der Maschine keinerlei Kraftwirkung nach außen auftritt.

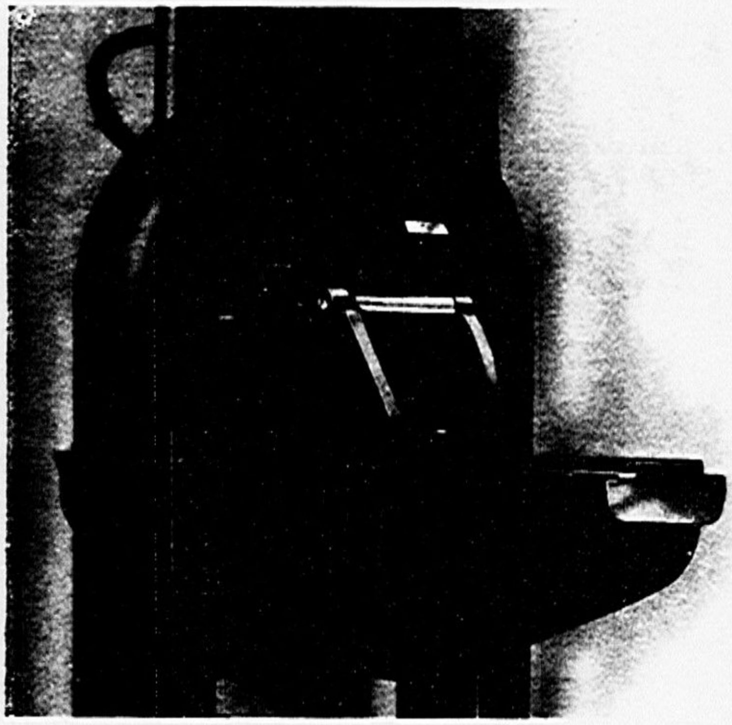

Abb. 2. Faltversuch.

Akkumulator. Eine wertvolle Ergänzung zum elektrischen Antrieb stellt der Akkumulator dar. Er ist auf ein Mehrfaches des Betriebsdruckes geprüft, gegen Überlastung durch ein Sicherheitsventil geschützt und jede Explosionsgefahr ist ausgeschlossen. In seiner Eigenschaft als Arbeitsspeicher erhöht der Akkumulator die Leistung der Maschine in Bezug auf feinste Regelbarkeit und rasche Durchführung der Versuche bei völlig stoßfreier Belastungssteigerung beträchtlich.

Bei der Ausführung mit Akkumulator ist stets elektrischer Antrieb erforderlich. Jede mit elektrischem Antrieb versehene Maschine kann aber im Bedarfsfalle auch ohne weiteres von Hand betrieben werden.

Genauigkeit. Die Kraftanzeige der Maschine wird nach Fertigstellung nach dem derzeit exaktesten Verfahren (Eichung mit Eichstäben des Staatl. Material-Prüfungsamtes in Berlin-Dahlem und Martens'schem Spiegelapparat) überprüft. Wir garantieren von einer Gesamtlast von 3% der Maschinen-Kapazität an eine Genauigkeit von ± 1%.

Zugversuche. Es können mit den in Abb. 3 dargestellten Universal-Spannköpfen nicht nur Normalstäbe und Normalkurzstäbe, sondern unter Verwendung jederzeit lieferbarer Zusatzeinrichtungen auch Proportionalstäbe und schulterlose Flach- und Rundstäbe zerrissen werden. Die nach modernsten Gesichtspunkten entworfenen Einspannorgane ermöglichen bequemes, rasches Ein- und Ausspannen; ferner die unbehinderte Beobachtung der ganzen Probe. Bei Verwendung von Feinmeßgeräten kann ohne weiteres auch die Elastizitäts- und die Proportionalitäts-Grenze bestimmt werden.

Eindruck-Härteproben. Auf der Maschine können ohne jeden Umbau solche Proben vorgenommen werden, vor allem die **genormte Brinellprobe.** Zur Durchmesserbestimmung des Kugeleindruckes liefern wir ein Brinell-Mikroskop mit, dessen Spezialteilung auch die unmittelbare Ablesung der Zerreißfestigkeit gestattet (Abb. 4).

Falt- und Biegeproben. Faltversuche sind bis zu einem Faltwinkel von 180° durchführbar, Biegeversuche bis zu einer freien Biegelänge von 1000 mm. Abb. 2 zeigt den Faltversuch; ähnlich, nur mit niedrigeren Auflagern, ist die Biegeprobe.

Spannkopfaufhängung. Das obere Querhaupt trägt an zwei Zugstangen den oberen Spannkopf und ist in einer Kugelschale des Preßkolbens völlig frei beweglich gelagert. Die dadurch erzielte frei pendelnde Aufhängung des oberen

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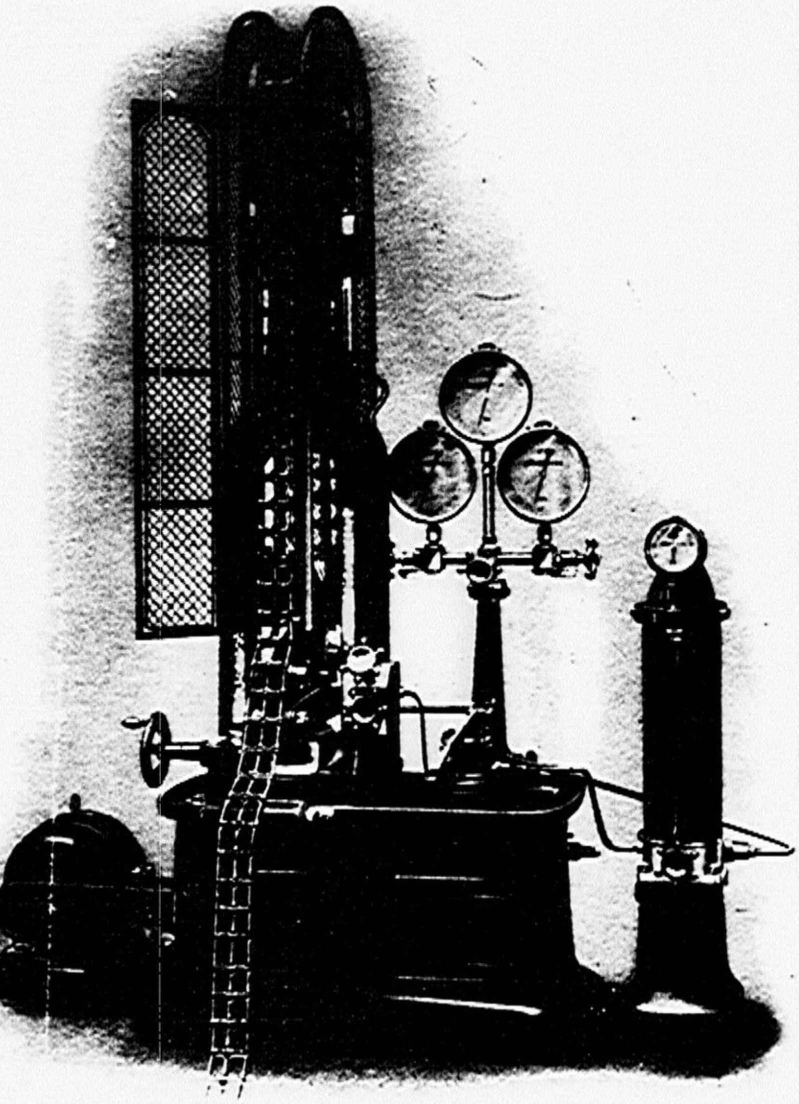

Abb. 7. Materialprüfmaschine MP, für alle Versuchsarten und mit Einrichtung zur Kettenprüfung (Patent). Ausgerüstet mit 3 Rohrfeder-Manometern.

Normalzubehör:

1 Differentialkolbenpumpe (bei Handbetrieb mit veränderlichem wirksamen Kolbenquerschnitt),
1 Einspannvorrichtung für Stäbe von 20 mm Durchmesser, bestehend aus:
  1 oberen und 1 unteren Schieber,
  2 Paar gehärteten und geschliffenen Beilagschalen, dazu
  2 Paar gehärtete und geschliffene Kugelringe,
1 Normalstab, 20 mm, als Muster,
1 Dehnungsmesser,
1 Vorrichtung für einfache Druckproben bis 40.000 kg, bestehend aus:
  1 unteren und 1 oberen Druckteller mit gehärteten und geschliffenen Kugelschalen,
1 Einsatzstück für Brinell'sche Kugeldruckproben, mit Kugel von 10 mm Durchmesser,
1 Brinell-Mikroskop zum Messen des Kugeldruckdurchmessers, mit einer Millimeterskala bis 7 mm und einer Sonderteilung zum direkten Ablesen der Zerreißfestigkeiten bei Eisen- und Stahlsorten von 35 bis 100 kg Zerreißfestigkeit, mit Justierplatte und Gebrauchsanleitung,
1 Satz Schraubenschlüssel,
1 Tabelle der Brinell'schen Härtezahlen,
1 Betriebsanleitung.

Bei Ausrüstung mit Pendel-Manometer ferner:

1 Pendel-Manometer für 3 Meßbereiche (0—4000 kg, 0—12.000 kg, 0—40.000 kg) mit
  1 Diagrammschreibapparat einschl. 100 Diagrammblätter und Uhr zur Einstellung der Belastungszunahme,
1 Elektromotor 0,2 PS für das Pendel.

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

je 1 Manometer bis 10.000 kg und 40.000 kg Maximalbelastung,
1 Eichtabelle zum Ablesen der wirklichen Belastung.

Sonderzubehör:

Biegevorrichtung für Festigkeitsbiegeproben, einschließlich Faltversuch,
Einspannvorrichtung für 12 mm Stäbe bestehend aus:
  2 Paar gehärteten und geschliffenen Beilagschalen, Einspanngehänge und
  1 Proportionalstab, 12 mm, als Muster,
1 Martens-Kennedy-Zeigerapparat für 150 oder 100 mm Meßlänge,
1 Paar Verlängerungsstücke zum Prüfen kurzer Stäbe, mit Gewinde nach Wunsch,
1 Paar Muttern für Stäbe, mit Gewinde nach Wunsch,
1 Paar Einspannschieber für Flachmaterial sowie Rundmaterial ohne Köpfe,
1 Paar Eichschieber für Eichungen mit Martens'schem Spiegelapparat oder Meßdose,
je 2 Paar Beißkeile für Flachmaterial bis 50 mm Breite, und zwar: von 0—5 mm, 5—10 mm, 10--15 mm, 15—20 mm, 20—25 mm Stärke,
je 2 Paar Beißkeile für Rundmaterial, und zwar: von 3—5 mm, 5—10 mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke (für Rundmaterial von 0—3 mm dienen die Beißkeile für Flachmaterial von 0—5 mm),
1 Vorrichtung für Scherversuche an zylindrischen Stäben mit normal 12 mm, auf Wunsch mit 1—15 mm Durchmesser und 50 mm Länge,
1 Apparat für Lochversuche,
1 erhöhter Brinellkugelhalter für Brinellproben in Vertiefungen, mit Kugel von 10 mm Durchmesser,
Kontroll-Eichung mittels Meßdose durch den Surveyor des Lloyd's Register of Shipping (Meßdose wird mitgeliefert),
Meßdose allein,
Elektrischer Antrieb der Pumpe, kombiniert mit Handbetrieb (ohne Motor),
1 Elektromotor dazu von etwa 2 PS und zirka 1400 Touren pro Minute,
1 Akkumulator (hiebei muß auch der früher erwähnte elektrische Antrieb mitbestellt werden; Motor 3 PS).

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

1 drittes Rohrfeder-Manometer für Feinablesung, bis 2000 kg Meßbereich,
1 Diagramm-Schreibapparat mit 100 Diagrammblätteren.

Für Spezialzwecke (Ketten-, Feder-, Drahtseil-, Baustoff-Prüfung, Warmzerreißversuche usw.) liefern wir Sonder-Einrichtungen bezw. -Ausführungen. Angebote darüber stehen zu Diensten.

Ausführlichen Katalog bitten wir zu verlangen!

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Blatt Nr. 2

ERNST KRAUSE & Co
Aktiengesellschaft
WIEN

Wien den 27. Septemb. 1929.

an Tit. Grazer Waggon und Maschinenfabriks A.G.
Graz

Vorstehende Preise verstehen sich netto, unverpackt, ab Donauwerk Wien, exklusive Warenumsatzsteuer.

Zahlbar : netto, in der angeführten effekt. Währung

1/3 in bar ohne jeden Abzug sofort bei Rechnungserhalt, S 4505.—

2/3 bei Rechnungserhalt in einem Dreimonatsakzept, das nach Fälligkeit zur Hälfte bezahlt und zur Hälfte auf weitere drei Monate prolongiert wird.

Zinsen und Spesen gehen zu Ihren Lasten !

Unsere Rechnung lautet auf Schilling
im Wert von [illegible]72086 Gramm feinen
Goldes für einen Schilling.

Bei Zielüberschreitungen kommen 12%
Verzugszinsen in Anrechnung.

Beträge bis ö. S. 50,— bitten wir
gleichzeitig mit der Bestellung zu
überweisen!

84 B 69554

Unsere hydraulische Universal-Material-Prüf- und Zerreißmaschine
Modell MP 4

ist nach dem Prinzip der hydraulischen Pressen mit liderungsfreiem Kolben gebaut. Die Kraftbestimmung erfolgt durch Pendel-Manometer. — Die Maschine kann bis 40.000 kg bei Druck- und Zugproben beansprucht werden. Sie besteht im wesentlichen aus einer Pumpe, einem Preßzylinder, dem Pendel-Manometer zum **direkten** Ablesen der Belastung und den Kraftübertragungsorganen.

Der **Preßzylinder** ist aus hochwertigem, besonders dichtem Spezialstahlguß angefertigt.

Preßkolben und Zylinder sind geschliffen. Der Kolben besitzt sonst keinerlei Abdichtung als den sich zwischen den Wandungen bildenden Ölfilm, so daß nur reine Flüssigkeitsreibung auftritt. Dieser Reibungswert der bei allen Drücken konstant und verschwindend klein ist, wird schon in unserem Werk bei der Eichung der Maschine völlig ausgeglichen.

Der **Pumpenkörper** ist aus dem vollen Stahl hergestellt. Als Druckflüssigkeit dient ein gutes harz- und säurefreies Mineralöl.

Kraftablesung. Zum Ablesen der ausgeübten Kraft dient ein Pendelmanometer mit den drei Meßbereichen von 0 bis 4.000 kg, 0 bis 12.000 kg und 0 bis 40.000 kg. Da dieses Pendelmanometer keiner Abnützung unterworfen ist, oder durch Überbeanspruchung gefährdete Teile enthält, bleibt die Richtigkeit der Kraftablesung auch nach längster Betriebsdauer gewahrt.

Zur Einstellung einer bestimmten Prüfgeschwindigkeit (nach den Übernahmsbestimmungen der Deutschen Reichsbahn) dient eine in das Pendelmanometer eingebaute Uhr, deren Zeiger konzentrisch zu den Manometerzeigern angeordnet ist.

Diagrammschreibvorrichtung. Mit dem Pendelmanometer fest verbunden ist eine Diagrammschreibvorrichtung, die es gestattet, den Kraftverlauf in Abhängigkeit von der Dehnung graphisch festzulegen (Zerreißdiagramm).

Handbetrieb. Bei Maschinen mit Handbetrieb ermöglicht ein Kolben mit veränderlichem wirksamen Querschnitt rasches Zurücklegen toter Wege vor Versuchsbeginn, da der Maschinenkolben pro Hub des großen Pumpenkolbens um etwa 4 mm gehoben wird. Beim Arbeiten mit dem kleinen Pumpenkolben, also während des eigentlichen Versuches, beträgt der Weg des Maschinenkolbens 0.4 mm pro Hub.

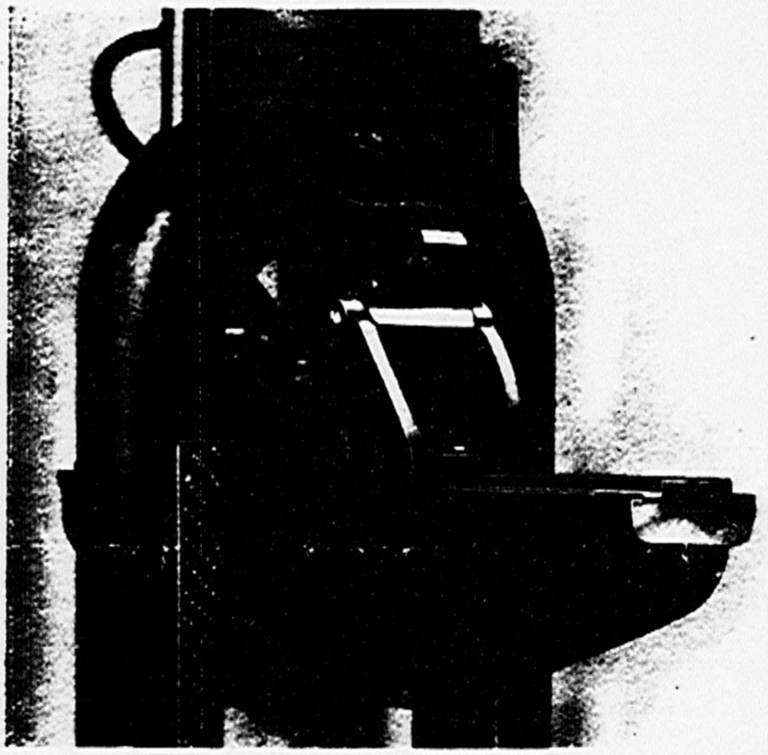

Abb. 2. Faltversuch.

Elektrischer Antrieb. Wird die Ausrüstung der Maschine mit elektrischem Antrieb gewünscht, so wird im Kastenfuß ein Schneckengetriebe eingebaut. Der Motor wird auf einer am Sockel der Maschine schwenkbar befestigten Motorspannplatte angebracht, so daß außer dem reinen Gewicht der Maschine keinerlei Kraftwirkung nach außen auftritt.

Akkumulator. Eine wertvolle Ergänzung zum elektrischen Antrieb stellt der Akkumulator dar. Er ist auf ein Mehrfaches des Betriebsdruckes geprüft, gegen Überlastung durch ein Sicherheitsventil geschützt und jede Explosionsgefahr ist ausgeschlossen. In seiner Eigenschaft als Arbeitsspeicher erhöht der Akkumulator die Leistung der Maschine in Bezug auf feinste Regelbarkeit und rasche Durchführung der Versuche bei völlig stoßfreier Belastungssteigerung beträchtlich.

Bei der Ausführung mit Akkumulator ist stets elektrischer Antrieb erforderlich. Jede mit elektrischem Antrieb versehene Maschine kann aber im Bedarfsfalle auch ohne weiteres von Hand betrieben werden.

Genauigkeit. Die Kraftanzeige der Maschine wird nach Fertigstellung nach dem derzeit exaktesten Verfahren (Eichung mit Eichstäben des Staatl. Material-Prüfungsamtes in Berlin-Dahlem und Martens'schem Spiegelapparat) überprüft. Wir garantieren von einer Gesamtlast von 3% der Maschinen-Kapazität an eine Genauigkeit von ± 1%.

Zugversuche. Es können mit den in Abb. 3 dargestellten Universal-Spannköpfen nicht nur Normalstäbe und Normalkurzstäbe, sondern unter Verwendung jederzeit lieferbarer Zusatzeinrichtungen auch Proportionalstäbe und schulterlose Flach- und Rundstäbe zerrissen werden. Die nach modernsten Gesichtspunkten entworfenen Einspannorgane ermöglichen bequemes, rasches Ein- und Ausspannen; ferner die unbehinderte Beobachtung der ganzen Probe. Bei Verwendung von Feinmeßgeräten kann ohne weiteres auch die Elastizitäts- und die Proportionalitäts-Grenze bestimmt werden.

Eindruck-Härteproben. Auf der Maschine können ohne jeden Umbau solche Proben vorgenommen werden, vor allem die **genormte Brinellprobe.** Zur Durchmesserbestimmung des Kugeleindruckes liefern wir ein Brinell-Mikroskop mit, dessen Spezialteilung auch die unmittelbare Ablesung der Zerreißfestigkeit gestattet (Abb. 4).

Falt- und Biegeproben. Faltversuche sind bis zu einem Faltwinkel von 180° durchführbar, Biegeversuche bis zu einer freien Biegelänge von 1000 mm. Abb. 2 zeigt den Faltversuch; ähnlich, nur mit niedrigeren Auflagern, ist die Biegeprobe.

Spannkopfaufhängung. Das obere Querhaupt trägt an zwei Zugstangen den oberen Spannkopf und ist in einer Kugelschale des Preßkolbens völlig frei beweglich gelagert. Die dadurch erzielte frei pendelnde Aufhängung des oberen

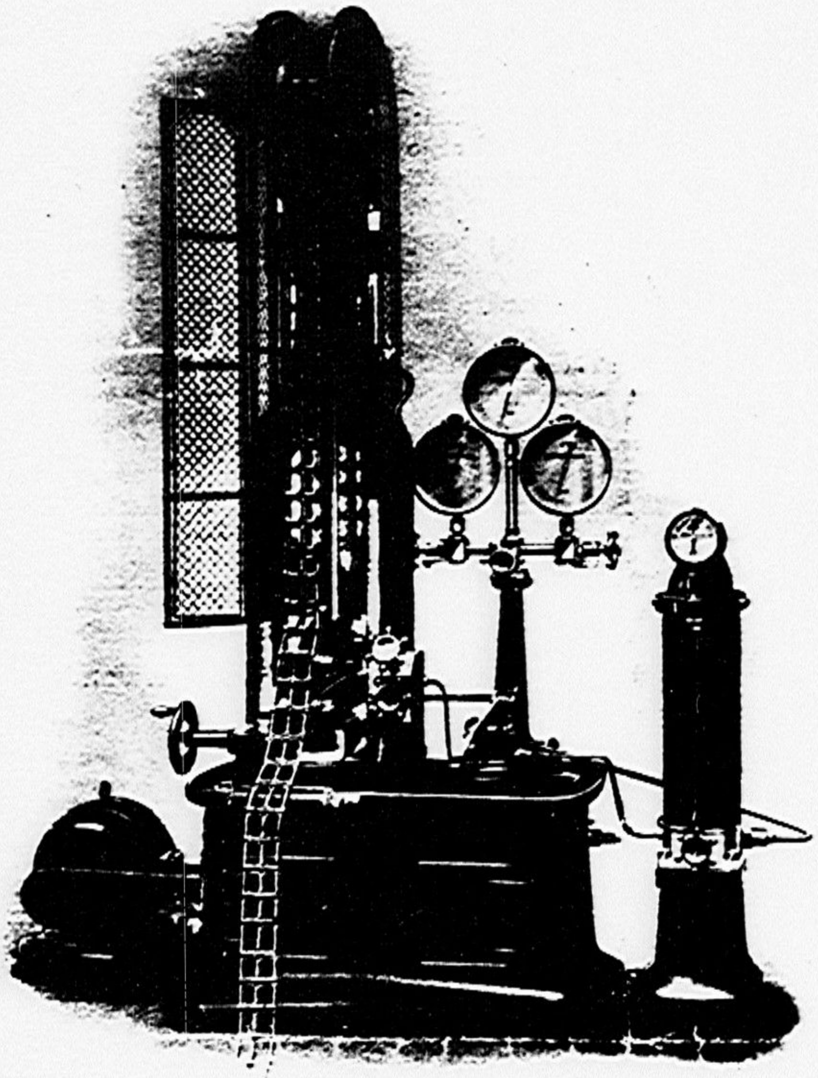

Abb. 7 Materialprüfmaschine MP. für alle Versuchsarten und mit Einrichtung zur Kettenprüfung (Patent). Ausgerüstet mit 3 Rohrfeder Manometern.

Normalzubehör:

1 Differentialkolbenpumpe (bei Handbetrieb mit veränderlichem wirksamen Kolbenquerschnitt),
1 Einspannvorrichtung für Stäbe von 20 mm Durchmesser, bestehend aus:
  1 oberen und 1 unteren Schieber,
  2 Paar gehärteten und geschliffenen Beilagschalen, dazu
  2 Paar gehärtete und geschliffene Kugelringe,
1 Normalstab, 20 mm, als Muster,
1 Dehnungsmesser,
1 Vorrichtung für einfache Druckproben bis 40.000 kg, bestehend aus:
  1 unteren und 1 oberen Druckteller mit gehärteten und geschliffenen Kugelschalen.
1 Einsatzstück für Brinell'sche Kugeldruckproben, mit Kugel von 10 mm Durchmesser,
1 Brinell-Mikroskop zum Messen des Kugeldruckdurchmessers, mit einer Millimeterskala bis 7 mm und einer Sonderteilung zum direkten Ablesen der Zerreißfestigkeiten bei Eisen- und Stahlsorten von 35 bis 100 kg Zerreißfestigkeit, mit Justierplatte und Gebrauchsanleitung,
1 Satz Schraubenschlüssel,
1 Tabelle der Brinell'schen Härtezahlen,
1 Betriebsanleitung.

Bei Ausrüstung mit Pendel-Manometer ferner:

1 Pendel-Manometer für 3 Meßbereiche (0—4000 kg, 0—12.000 kg, 0—40.000 kg) mit
  1 Diagrammschreibapparat einschl. 100 Diagrammblätter und Uhr zur Einstellung der Belastungszunahme,
1 Elektromotor 0,2 PS für das Pendel.

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

je 1 Manometer bis 10.000 kg und 40.000 kg Maximalbelastung,
1 Eichtabelle zum Ablesen der wirklichen Belastung.

Sonderzubehör:

Biegevorrichtung für Festigkeitsbiegeproben, einschließlich Faltversuch,

Einspannvorrichtung für 12 mm Stäbe bestehend aus:
  · 2 Paar gehärteten und geschliffenen Beilagschalen, Einspanngehänge und
  1 Proportionalstab, 12 mm, als Muster,

1 Martens-Kennedy-Zeigerapparat für 150 oder 100 mm Meßlänge,

1 Paar Verlängerungsstücke zum Prüfen kurzer Stäbe, mit Gewinde nach Wunsch,

1 Paar Muttern für Stäbe, mit Gewinde nach Wunsch.

1 Paar Einspannschieber für Flachmaterial sowie Rundmaterial ohne Kopfe.

1 Paar Eichschieber für Eichungen mit Martens'schem Spiegelapparat oder Meßdose,

je 2 Paar Beißkeile für Flachmaterial bis 50 mm Breite, und zwar: von 0—5 mm, 5—10 mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke,

je 2 Paar Beißkeile für Rundmaterial, und zwar: von 3—5 mm, 5—10 mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke (für Rundmaterial von 0—3 mm dienen die Beißkeile für Flachmaterial von 0—5 mm),
1 Vorrichtung für Scherversuche an zylindrischen Stäben mit normal 12 mm, auf Wunsch mit 1—15 mm Durchmesser und 50 mm Länge,
1 Apparat für Lochversuche
1 erhöhter Brinellkugelhalter für Brinellproben in Vertiefungen, mit Kugel von 10 mm Durchmesser,
Kontroll-Eichung mittels Meßdose durch den Surveyor des Lloyd's Register of Shipping (Meßdose wird mitgeliefert),
Meßdose allein,
Elektrischer Antrieb der Pumpe, kombiniert mit Handbetrieb (ohne Motor),
1 Elektromotor dazu von etwa 2 PS und zirka 1400 Touren pro Minute,
1 Akkumulator (hiebei muß auch der früher erwähnte elektrische Antrieb mitbestellt werden; Motor 3 PS).

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

1 drittes Rohrfeder-Manometer für Feinablesung, bis 2000 kg Meßbereich,
1 Diagramm-Schreibapparat mit 100 Diagrammblättern.

Für Spezialzwecke (Ketten-, Feder-, Drahtseil-, Baustoff-Prüfung, Warmzerreißversuche usw.) liefern wir Sonder-Einrichtungen bezw. -Ausführungen. Angebote darüber stehen zu Diensten.

Ausführlichen Katalog bitten wir zu verlangen!

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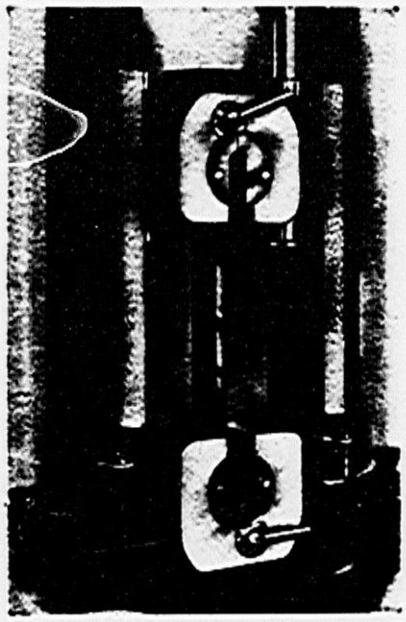

Abb. 3. Keilspannköpfe für 40 t

Spannkopfes **ohne jede Führung im Bügel** gibt Gewähr für die zentrische Einstellung der Probe und damit Ausschaltung aller störenden Zusatzbeanspruchungen.

Verstellbare Säulen. Die über Schnecke und Schneckenrad mit Hilfe einer Handkette verstellbaren Säulen gestatten volle Ausnützung der Bauhöhe der Maschine für jede Versuchsart und damit die Prüfung auch abnormal langer und sperriger Proben.

Druck- und Knickversuche können an allen Baustoffen des Hoch- und Maschinenbaues vorgenommen werden. Besonders vorteilhaft ist dabei, daß der Preßzylinder durch seine Anordnung vor Verschmutzung durch Staub geschützt ist.

Lochversuche und Tiefungsproben sind für die Beurteilung der Bearbeitungsfähigkeit sehr wertvoll. Mittels einfacher Vorrichtungen sind sie ohne große Mühe durchführbar.

Scherversuche geben Aufschluß über den Scherwiderstand, der aus der Zugfestigkeit nicht unmittelbar festzustellen ist. Die Sondereinspannvorrichtung hiezu ist derart ausgeführt, daß Biegungsbeanspruchungen vollständig ausgeschaltet sind.

Über alle hier angeführten Versuchsarten gibt unser Sonderkatalog genauen Aufschluß.

Die Maschine ist anerkannt vom Lloyds Register of Shipping, London — Germanischer Lloyd — Bureau Veritas.

Mehrere 100 Maschinen stehen in allen europäischen und Überseestaaten in Verwendung; sie arbeiten zur vollsten Zufriedenheit in den

Hochschullaboratorien,
großen Werken der Privatindustrie,
in staatlichen Betrieben,
Arsenalen,
Eisenbahn-Werkstätten usw.

Hauptabmessungen:

Größte Kraftäußerung	40.000 kg	Größte Entfernung der Druckplatten	720 mm
Hub	250 mm	Größte freie Biegelänge	1.000 mm
Größte Entfernung der Spannköpfe	850 mm	Größte Höhe der Maschine	3250 mm
Gewicht mit Normalzubehör	ca. 1200 kg		

Der Bau der Maschine erfolgt in Serien mittels Vorrichtungen; alle Wellen, Bolzen usw. sind geschliffen nach Toleranz-Lehren (DI-Normen).

Die Eichung geschieht mit den modernsten behördlich geeichten Instrumenten und die Genauigkeit entspricht den strengsten Vorschriften der staatlichen Versuchsanstalten.

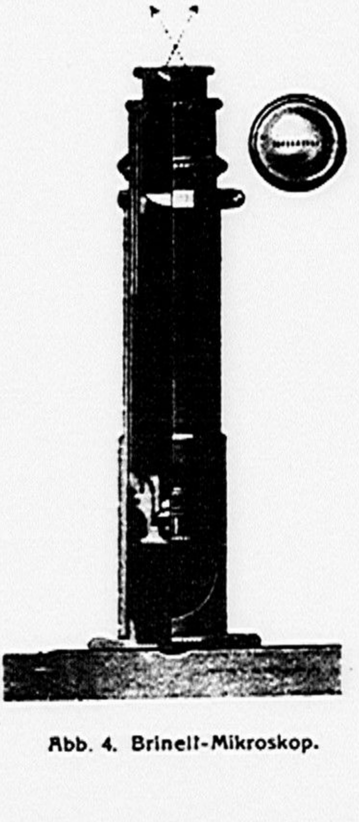

Abb. 4. Brinell-Mikroskop.

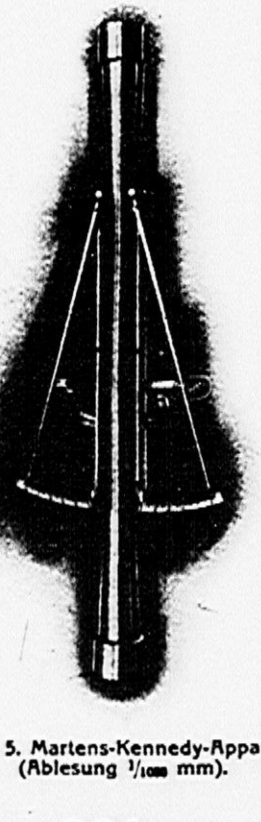

Abb. 5. Martens-Kennedy-Apparat (Ablesung $^1/_{1000}$ mm).

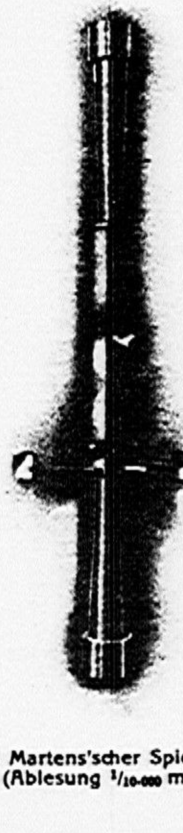

Abb. 6. Martens'scher Spiegelapparat (Ablesung $^1/_{10000}$ mm).

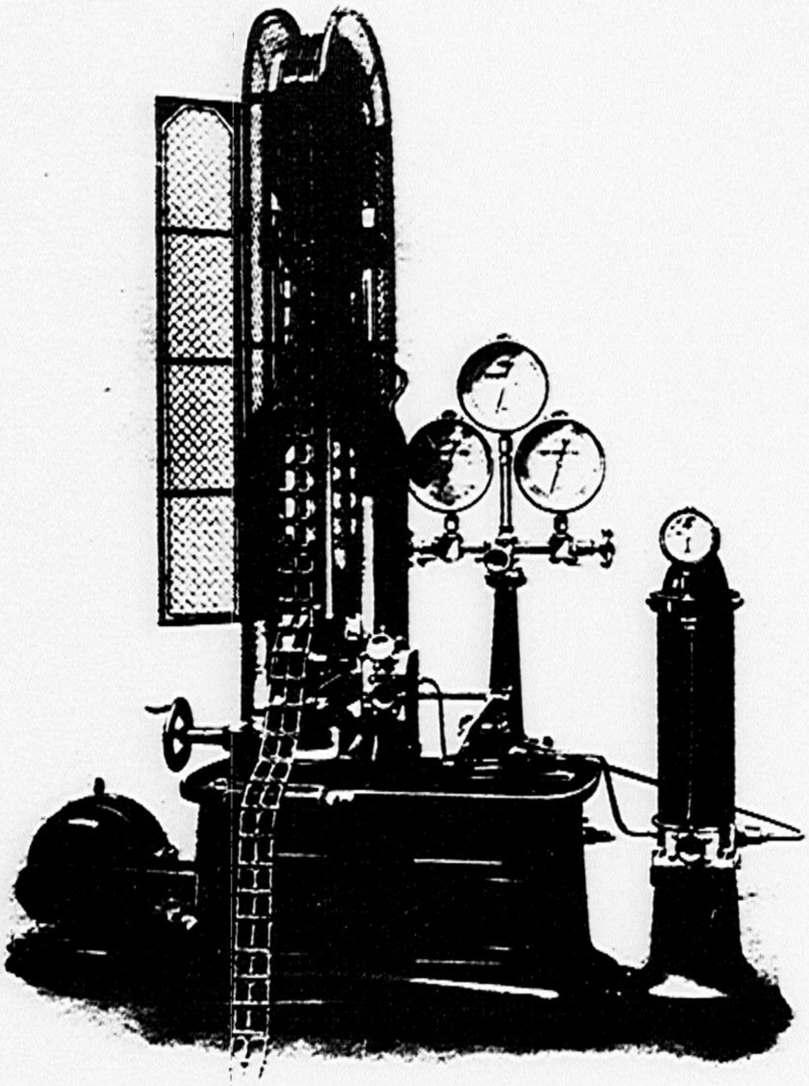

Abb. 7. Material-Prüfmaschine MP, für alle Versuchsarten und mit Einrichtung zur Kettenprüfung (Patent). Ausgerüstet mit 3 Rohrfeder-Manometern.

Normalzubehör:

1 Differentialkolbenpumpe (bei Handbetrieb mit veränderlichem wirksamen Kolbenquerschnitt),
1 Einspannvorrichtung für Stäbe von 20 mm Durchmesser, bestehend aus:
  1 oberen und 1 unteren Schieber,
  2 Paar gehärteten und geschliffenen Beilagschalen, dazu
  2 Paar gehärtete und geschliffene Kugelringe,
1 Normalstab, 20 mm, als Muster,
1 Dehnungsmesser,
1 Vorrichtung für einfache Druckproben bis 40.000 kg, bestehend aus:
  1 unteren und 1 oberen Druckteller mit gehärteten und geschliffenen Kugelschalen,
1 Einsatzstück für Brinell'sche Kugeldruckproben, mit Kugel von 10 mm Durchmesser,
1 Brinell-Mikroskop zum Messen des Kugeldruckdurchmessers, mit einer Millimeterskala bis 7 mm und einer Sonderteilung zum direkten Ablesen der Zerreißfestigkeiten bei Eisen- und Stahlsorten von 35 bis 100 kg Zerreißfestigkeit, mit Justierplatte und Gebrauchsanleitung,
1 Satz Schraubenschlüssel,
1 Tabelle der Brinell'schen Härtezahlen,
1 Betriebsanleitung.

Bei Ausrüstung mit Pendel-Manometer ferner:

1 Pendel-Manometer für 3 Meßbereiche (0—4000 kg, 0—12.000 kg, 0—40.000 kg) mit
  1 Diagrammschreibapparat einschl. 100 Diagrammblätter und Uhr zur Einstellung der Belastungszunahme,
1 Elektromotor 0,2 PS für das Pendel.

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

je 1 Manometer bis 10.000 kg und 40.000 kg Maximalbelastung,
1 Eichtabelle zum Ablesen der wirklichen Belastung.

Sonderzubehör:

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  2 Paar gehärteten und geschliffenen Beilagschalen, Einspanngehänge und
  1 Proportionalstab, 12 mm, als Muster,
1 Martens-Kennedy-Zeigerapparat für 150 und 100 mm Meßlänge,
1 Paar Verlängerungsstücke zum Prüfen kurzer Stäbe, mit Gewinde nach Wunsch,
1 Paar Muttern für Stäbe, mit Gewinde nach Wunsch,
1 Paar Einspannschieber für Flachmaterial sowie Rundmaterial ohne Köpfe,
1 Paar Eichschieber für Eichungen mit Martens'schem Spiegelapparat oder Meßdose,
je 2 Paar Beißkeile für Flachmaterial bis 50 mm Breite, und zwar: von 0—5 mm, 5—10 mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke,
je 2 Paar Beißkeile für Rundmaterial, und zwar: von 3—5 mm, 5—10mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke (für Rundmaterial von 0—3 mm dienen die Beißkeile für Flachmaterial von 0—5 mm),
1 Vorrichtung für Scherversuche an zylindrischen Stäben mit normal 12 mm, auf Wunsch mit 1—15 mm Durchmesser und 50 mm Länge,
1 Apparat für Lochversuche,
1 erhöhter Brinellkugelhalter für Brinellproben in Vertiefungen, mit Kugel von 10 mm Durchmesser,
Kontroll-Eichung mittels Meßdose durch den Surveyor des Lloyd's Register of Shipping (Meßdose wird mitgeliefert),
Meßdose allein,
Elektrischer Antrieb der Pumpe, kombiniert mit Handbetrieb (ohne Motor),
1 Elektromotor dazu von etwa 2 PS und zirka 1400 Touren pro Minute,
1 Akkumulator (hiebei muß auch der früher erwähnte elektrische Antrieb mitbestellt werden; Motor 3 PS).

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Ausführlichen Katalog bitten wir zu verlangen!

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Connecticut Society of Professional Engineers, the National Society of Professional Engineers, and the Army Ordnance Association.

* * * * * * * * * *

13 In all testing there are two points which we try to bring out. First, as you begin to pull a piece of steel, it elongates elastically until the point is reached known as the "yield point". Beyond that it begins to pull plastically and necks down, which is a characteristic action. That is a piece of cold rolled steel.

* * * * * * * * * *

(A model machine was exhibited).

Q. 6. Mr. Emery, it may aid the Court's understanding to describe the model at this point. A. A testing machine is necessarily composed of two portions, a portion for applying the load to the specimen, and the second a portion
for indicating the load on that specimen; and I have
14 a model of the small machine here. This is a model
of a small hydraulic type testing machine. This (indicating) moves up and down under power. The power is furnished by a pump and an electric motor, here (indicating) and here (indicating); and their operation produces hydraulic pressure, which passes in through this pipe, here (indicating), comes under this ram, raising it.

If you have a block of concrete under here (indicating), as this (indicating) comes up it puts the load of compression on it.

If you have a specimen placed between this space 14 and the crosshead 4, as this part 3 moves up it places the specimen under compression.

If, on the other hand, the specimen is placed between the upper end 15 and the crosshead 4, as this moves up, this specimen is placed in tension.

In either case the load comes over on to this yoke, number 4, in such a manner as to raise it or, rather, to try to raise it. That force is then carried down the side members into a device above numbered 6 and converted into hydraulic pressure. That pressure goes through a small tube, over on to this indicator (indicating), and the motion of this black hand, numbered 20—it will rotate exactly in accordance with the load on the specimen, here (indicating).

As the load is put on, this black hand moves up; and after it moves away it picks up the second hand, the red hand, which we call the maximum load hand. It carries the maximum load hand as long as the load is increasing.

Finally you will obtain the maximum load on your specimen and it will rupture—your black hand will return, but
the maximum load hand will stay at the maximum
15 load and indicate just what the maximum load was.
So that there are two hands on this model, as is customary on testing machines.

Then this hand (indicating the red hand) will be brought back for the next test.

By the Court:

Q. 8. How does that indicate the rate? A. This does not indicate any rate at all. It is just a standard machine, with no special means for showing the rate.

Q. 9. The indicator is something like one of these recording thermometers that indicate maximum and minimum temperatures? A. Yes, sir.

Up until fairly recent times, it was indicated in quite a different way, as will be shown in some other illustrations; but this is the indication by rotating the hand on the dial.

Mr. Hathaway: Now I offer the model just referred to by the witness as Plaintiffs' Exhibit 4.

(The model so produced and identified was received in evidence and by the reporter marked Plaintiffs' Exhibit 4.)

By the Court:

Q. 10. As I understand, the indicator simply has the same
effect as one of these self-registering thermometers?
15 A. Yes, sir, exactly.

* * * * * * * * * *

16 A. This machine shown in photograph 2722 A. K.
has a capacity of four million pounds. It is erected

out at the University of California. The indicator, which has four dials of the same type, appears at the right.

This concrete specimen, shown in photograph 2722-V, broke in the acceptance test of this machine; and, if my memory is right, it broke at about three million pounds or a little over.

This other machine, shown in photograph 3310-1,—there is nothing here to show its capacity, but it is a standard size for 300,000 or 400,000 pound machines; that is, it is capable of exerting a force of tension or compression of three or four hundred thousand pounds.

* * * * * * * * * *

This patent, No. 1,848,468, issued to A. H. Emery, Jr. contains a line drawing which is the same as the model which I have just shown you.

Mr. Hathaway: I offer in evidence the three photographs referred to by the witness, numbered 2722 A.K., 2722-V, and 3310-1, as Plaintiffs' Exhibits 5-A, 5-B, and 5-C.

(The photographs so produced and identified were received in evidence and by the reporter marked Plaintiffs' Exhibits 5-A, 5-B, and 5-C.)

Mr. Hathaway: I offer in evidence the patent referred to by the witness, Emery patent No. 1,848,468, as Plaintiffs' Exhibit 6.

(The patent so produced and identified was received in evidence and by the reporter marked Plaintiffs' Exhibit 6.)

17 Mr. Hathaway: I also offer in evidence the physical specimens referred to by the witness as Plaintiffs' Exhibit 7.

(The specimens so produced and identified were received in evidence and by the reporter marked collectively Plaintiffs' Exhibit 7.)

* * * * * * * * * *

19 Q. 13. Mr. Emery, will you please explain some of
the attempts that have been made to provide ma-
chines for overcoming this problem in the past? Just
briefly describe such machines and briefly give the disad-
vantages of such machines. A. Well, there have
20 been two methods of attacking this problem: first,
by controlling the rate at which your press operates,
that is the rate at which your force is applied and the mem-
ber moves. That has been attempted in several ways—in
the screw power machine by having various speeds of the
motors and various types of motors; and the disadvantage
is that while under no load that may be running at a uni-
form rate of speed, as soon as you get a specimen in and
apply the load, the rate changes, the specimen deforms, and
you do not get the effect that you hoped for.

* * * * * * * * * *

Q. 14. Do you have a patent there that might illustrate this type of machines to which you have just referred? A. That type of machine is very well shown in the Olsen patent, No. 445,476, which shows the gearing and the moving heads and the specimen in the same general way as discussed in connection with the model.

* * * * * * * * * *

21 Mr. Hathaway: We offer in evidence as Plaintiffs' Exhibit 10 a copy of the Olsten patent, No. 445,476.

(The document so produced and identified was received in evidence and by the reporter marked Plaintiffs' Exhibit 10.)

* * * * * * * * * *

Q. 15. Will you proceed? A. I have spoken of the hydraulic type of machine. This is very well illustrated by a typical machine such as the Amsler, and a very good illustration of that is given in the "D. U. Technical Series", Volume 1, which shows the machine and the indicating devices—this is a dial type.

In this type of machine the endeavor is to get uniform speed of tests by control of flow of oil. That does it partially. But, in order to do it completely, Amsler found it necessary to introduce special valves which make the motion of the head uniform irrespective of the load on the specimen.

That is referred to in the Amsler patent, which illustrates that and describes it. I do not think you would want to go into description of it, except to say that the Amsler patent No. 1,467,522 illustrates and describes, in lines 25 to 29 of page 1, this special valve.

* * * * * * * * * *

Mr. Hathaway: I offer in evidence copy of the publication just referred to by the witness, the title page, pages 68 and 69 and Figs. 54, 55 and 56, constituting a part of a treatise entitled Mechanical Testing, by Batson and Hyde, Volume 1, as Plaintiffs' Exhibit 11.

I also offer in evidence the Amsler patent No. 1,467,522, just referred to by the witness, as Plaintiffs' Exhibit 12.

(The copies of documents so produced and identified were received in evidence and by the reporter marked Plaintiffs' Exhibit 11 and Plaintiffs' Exhibit 12.)

Q. 16. Mr. Emery, will you refer back to that Olsen patent, No. 445,476, and please show the Court how the rate of head motion there is not a true indication of the load as actually applied to the specimen, in other words, that the rate of head motion is deceiving?

* * * * * * * * * *

22 A. Well, while the motor runs at constant speed and therefore rotates the screws numbered 6 at constant speed, you will have deformation of the screws, deformation of the frame, and a slipping of the specimen in the grips, all of which can come in between the uniform speed of the nuts on the screws and the actual uniform application of the load to the specimen, so that it does not give you true speed of testing.

By Mr. Hathaway

Q. 17. Mr. Emery, does the speed of head motion remain uniform as the specimen stretches? A. The speed of the head is supposed to be kept uniform but, as a matter of fact, as I have stated, from all these deformations of the machine and stretching of the parts and slipping of the grips, the actual effect is not uniform.

Q. 18. In the Amsler patent, to which you referred, page 1, lines 27 to 29—

23 The Court (interposing) What patent is that?

Mr. Hathaway: The Amsler patent, No. 1,476,522, Plaintiffs' Exhibit 12.

* * * * * * * * * *

Q. 19. In the Amsler patent, page 1, lines 27 to 29, it states:

"In consequence of the uniformity of this over pressure, the piston of the press moves always at the same speed."

Now, what is the piston there and what is its relation to the part that engages the specimen? A. Well the relation is just the same as I already mentioned between the screws and nuts and the specimen, that you have between the uniform speed of the press and the specimen, you have the parts of the testing machine, which stretch and deform and while—suppose we take this (indicating) this is a hydraulic type of machine; and, although you may be able to move this part (indicating) at the same speed, by the time you get up here (indicating) to the test specimen, you have the deformation of this part (indicating) and this part (indicating)—all of which affect the rate at which the specimen itself is receiving load. In addition to that, very frequently the specimen itself will slip in the grips and thus will have to move some before any additional load can be received.

Q. 20. When the piston moves up does the head 14 travel with it? A. Yes; that travels as an integral part of
24 it. This (indicating) is made so heavy that they can control that. Beyond that, you will have to make the parts lighter and they do deform.

Q. 21. Now, Mr. Emery, in referring to this Amsler patent No. 1,467,522—does that control valve appear anywhere in the D. U. Series publication, Plaintiffs' Exhibit 11, to which you referred recently? A. Apparently it is the valve here at the left of the main table (indicating).

Q. 22. Will you mark that with a pencil, "Amsler valve"? Just run an arrow out to the side of the margin. A. (The witness wrote on Plaintiffs' Exhibit 11, with red pencil, "Amsler Valve".)

Q. 23. As I understand it now, the use of that Amsler valve in this Amsler type machine will give you a uniform rate of head motion. A. That, in connection with the other main control valves and perhaps the secondary control valve, all of which enable the operator to get any desired speed of testing and this particular valve makes or tends to make that speed of testing uniform throughout the test.

The Court: What exhibit is that?

(Plaintiffs' Exhibit 11 was handed to the Court.)

By Mr. Hathaway:

Q. 24. You might show this to the Judge, show him the valve which you have marked. A. This is the valve, your Honor, here (indicating), on this copy of that exhibit.

Q. 25. Now, Mr. Emery, will you describe very briefly such further attempts as might have been made? A. Well, the attempts that I have described so far are to control speed of test by controlling the rate at which the load applying member moves.

The other method was to control the load on the specimen. Perhaps a couple of machines by Olsen would illustrate how that has been attempted. I would refer to Olsen Catalog 10, Part C, Page Twenty-Two. This machine was developed for testing samples of cement. They were made dumb-bell shape and were pulled until they broke. Here the load was applied by allowing buckshot to run out of the counter-weighted container.

Q. 26. Will you mark the container, at the left? A. (The witness marked, with red pencil "#1".)

The counter-weight I will mark number 2. (The witness marked, in red pencil, "2".)

At the right is the actual load applying device. As the buckshot runs out of "#1" the weight, number "2", through the lever system, applies load to the concrete or, rather, the cement dumb-bell shaped test specimen. If the buckshot runs out at a uniform rate of speed the load is applied to the specimen at a uniform rate of speed.

That was one of the attempts to obtain the desired results. That, however, as you see, is suitable only for small specimens. It would not be practical to make it in a large size. It also has the disadvantage that the gate does not always operate right and you do not always get what you think you get.

Another attempt that was made to do the same thing is shown on page 28, Plate No. 30—no. I am wrong. Plate No. 31. Here the load is measured by a jockey weight, running out on the beam there; and if you can keep the poise, "#1" (writing in red pencil "#1"), at the top, floating,
it shows that you have on the exact weight or the
26 exact load that the position of the jockey weight indicates.

As he says in the text here:

"Load can be applied at a regular rate as may be desired at either 400, 600 or 800 pounds per minute."

This illustration shows a small motor, which runs that jockey weight out at the desired rate; and then the operator applies load in an endeavor to keep the beam floating and so indicate that he has on the load which the position of the jockey weight indicates. If he can obtain that, he then has a uniform rate of loading. That, again, is not practical for any large sized testing machine. It does serve in a measure if a man is expert enough to keep it in balance and it does give him a method of applying the load at a uniform rate of speed.

Mr. Hathaway: I offer in evidence page 22 and page 28 of the Olsen Catalog 10, Part C, just referred to by the witness, as Plaintiffs' Exhibit 13.

(The catalog so produced and identified was received in evidence and by the reporter marked Plaintiffs' Exhibit 13.)

Q. 27. Will you describe the use of the metronome in connection with testing machines? A. With the dial type of indicators, such as is shown on this model (Plaintiffs' Exhibit 4), the attempt has been made by the use of the metronome to apply load at a uniform rate. This (producing a metronome) is just an ordinary metronome, such as used in the study of music; and if the operator calculates the increments of load that he wants to apply, we will say, per second, it will be like this (operating the metronome). That thing will proceed to beat seconds.

Now, if he watches—we will say that he wants to apply
a load of 200 pounds per second—he knows when the
27 pointer becomes 400, 600, 800 pounds, and so on, he
knows that he is applying the load at the desired
rate. The trouble is that you have got to coordinate your ear and eye to see what you are doing. If you are short on the first tick, you have got to speed up the machine a little bit by the control valves, hoping you do not overshoot on the second tick, and then slow it down again, so that it is a continuous correction and not a continuous indication that you are doing what you want to do.

That has been tried and is used in a good many places. I have seen it used at the National Bureau of Standards as an attempt to solve this problem.

Q. 28. Have you enumerated all the disadvantages that might be attendant upon that method of testing? A. Well, it is very difficult. It is not very easy to coordinate with your eye and ear and hand. You have got to make mental calculations all the time, to know whether you are doing what you want to do; and you will get mixed up and lost and you will become very much lost. It is not a continuous operating device. Furthermore, you have got to figure out, to begin with, what you want for your time interval and what you want for your load interval.

Q. 29. Mr. Emery, I show you a copy of the bulletin relied upon by the Patent Office, which is to be marked Plaintiffs' Exhibit 14. Will you take this bulletin, together with the translation, Plaintiffs' Exhibit 3, and tell the Court what that disclosure means to you? A. This is a German bulletin of Ernst Krause & Co., showing a hydraulic type testing machine very similar to the Amsler machine already described. It presumably has the same type of controls in general as shown there; and the description starts off with what the machine is, its capacity, its type, and says:

"Testing Speed Adjustable".

28 That is what you usually find in all these hydraulic machines—they are very adjustable; that is, you have a very fine control of the speed of testing. I spoke of that in Amsler; and Amsler gets a secondary refinement by the use of the special valve which we have already discussed.

This Krause bulletin goes on and describes the construction, how it is operated, and the different tests that can be made with it, and that it has a pendulum scale, which is the same type as the Amsler machine has.

It speaks in the second page of the fine adjustment for speed. It says:

"For measuring of a desired testing speed (in accordance with acceptance regulations of the German Railroad), a time clock is used."

Mr. Hathaway: We offer in evidence as Plaintiffs' Exhibit 14, the Krause & Co. bulletin.

(The document so produced and identified was received in evidence and by the reporter marked as Plaintiffs' Exhibit 14.)

Q. 31. Mr. Emery, will you point that out on the translation, so that the Court can see to what you refer? A. This is the paragraph, right here (indicating).

The Court: A paragraph near the bottom of page 2.

The Witness: It is on the second page of the original printed publication, beginning here (indicating); and on the first page there is a reference which I think is translated on the second page of the translation here (indicating).

29 By Mr. Hathaway:

Q. 32. Mark that and show it to the Judge. A. It is the third paragraph up from the bottom of the second page of the translation.

Mr. Edwards: About the middle of page 1 of the translation it says "Testing Speed Adjustable, in accordance with regulations of the German Railroad".

And again, the last line on page 1 of the translation, "finest regulation of testing speed".

By Mr. Hathaway

Q. 33. Will you proceed? A. I have already spoken of this in the Amsler machine, which is a very close counterpart of this Krause device, that it is a hydraulic machine and through these valves they are able to get the very fine regulation of testing speeds, which is very desirable.

Looking at the illustration, you see the dial indicator for indicating the load. It has a second hand, which is very similar to the maximum load hand which we saw on the model.

It is also very similar to the one shown on the Riehle machine and also very similar to the one shown on the Amsler machine. The Riehle machine is shown in this catalogue—I don't seem to have the catalogue number here—it is page U-61, and described on page U-62:

"All indicators have two pointers, one following any change in load and the other remaining at the maximum load until returned to zero by hand."

That is exactly what you saw in the model.

Again in Amsler's Catalogue, General Catalogue G. C. 26, page 2, it describes the same thing:

30 > "A loose pointer engaged by the indicating pointer as it rises, remains in the highest position reached,

whilst the fixed pointer returns to zero, and thus it indicates the maximum load attained."

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31 Q. 37. Mr. Emery, on the Krause bulletin will you point out where the head is that would have the uniform rate of head motion according to the Amsler control valve, which you say is shown in that Krause bulletin? A. It is the intermediate head, marked number 2, which is just above the test specimen.

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32 Q. 40. Will you show its relation to the Amsler patent, Plaintiffs' Exhibit 11, and identify the corresponding part in Plaintiffs' Exhibit 11? A. The corresponding part in the Amsler patent is the wide crosshead. It has no reference number.

Q. 41. Put one on there. A. Reference number 1 (writing on Plaintiffs' Exhibit 11).

Q. 42. Will you continue to show the Court the similarity between the Amsler machine and this Krause machine, showing where the load cylinder is and the way the load is transmitted to this head, to get a uniform rate of head motion? A. The two machines are very similar. Both are hydraulic machines of the vertical type. The cylinder we can mark number 3 on both copies. The crosshead we have already marked number 1 on both copies. The dial indicator we will mark number 4 on both copies.

By the Court:

Q. 43. That is a dial indicator with two hands? A. That is a dial indicator with two hands, in both illustrations. The Amsler is the typical pendulum type, marked number 5. The Krause according to the description is also of the pendulum type. We see the same arm going down, marked 5. The control valves are differently located. I have marked them number "1" on the Krause. I will mark them number "1-A" on the Amsler, Plaintiffs' Exhibit 11.

By Mr. Hathaway:

Q. 44. Will you show how the load is transmitted
33 from cylinder 3 down to the cross head 1? A. In both machines the cylinder is open at the top and as the liquid is forced in under the piston it carries up the upper crosshead, number 5, which are marked on both, through the two side rods, number 6, and it carries up the crosshead, number 1 of Amsler, marked 2 on Krause. Both machines as illustrated are set up for transverse specimens, that is, specimens supported at the two ends and loaded in the middle.

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Q. 45. Mr. Emery, referring to those exhibits, Plaintiffs' Exhibits 11 and 14, you have mentioned that the Amsler control valve shown in the Amsler patent might be or is the valve marked number 1 on Plaintiffs' Exhibit 14. Now, with that Amsler valve in the Krause machine, will that give rate of head motion or will it give rate of load control? A. As I said earlier, there are two methods, one by rate of head motion and the other by rate of load actually applied to the specimen. These Amsler machines have the control entirely by rate of head motion.

Q. 46. Will you identify the head that you refer to as having the rate of head motion? A. This head is head number 1 in the illustration of the Amsler machine, Plaintiffs' Exhibit 11, and head number 2 in the Krause bulletin, Plaintiffs' Exhibit 14.

Q. 47. Now, will you explain how this rate of head motion distinguishes or is different from the rate of load control? A. Well, the rate of head motion is exactly what it says. It is that this head is moving at a uniform rate of speed
34 and that this does not necessarily mean uniform rate of load application, because there is deformation of the machine itself and the slipping of the specimen and so forth.

There are two methods of endeavoring to attain the same object.

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35 The illustration on the first page of the bulletin shows a dial indicator, which might be considered concentric with the pendulum action, which has two hands. The second appears to be a *max.* hand, as we have explained the second hand, which is similar to the little red hand shown in the model. There is nothing in the illustration to show any clock.

We have used clocks in our Southwark Machinery Company machines, on the panels centrally located, where they are convenient for the observer to see and to get the time he is using in making the test—or it is used more frequently—as I explained earlier, that the test really divides into two parts, the test of the specimen up until the time it begins to yield and then the test from the yield point to the rupture point; and it is sometimes desirable to observe those time intervals, the time interval from the start of the test to the yield point and the time interval from the yield point to the rupture.

Q. 52. So that an ordinary clock does have some usefulness in the test? A. Exactly.

Q. 53. Is there anything in this bulletin to suggest anything other than an ordinary clock? A. No, sir; there is not; and nothing in the illustration at all. There is simply the one reference there, that it might be placed concentric with the pendulum.

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36 Q. 56. Do you have any illustration of uses of ordinary clocks placed concentric with the load hand in ordinary testing machines? A. Well, I have already spoken of our own practice of putting a clock central on the indicating panel; and, as a matter of fact, the photograph of the big machine that we put in evidence shows such a clock.

Then I would suggest that in a preprint of a paper, presented to the American Society for Testing Materials, by Paul G. Jones and H. F. Moore (Mr. Moore being one of the outstanding men in this country in the line of tests) on page 13 they make the following statement:

"Consider first tests with a screw-power testing machine. The time which elapses between yield strength and fracture may be measured by means of a watch, using a speed of head which, it is estimated, gives approximately the desired rate of strain. From the elongation of the specimen after fracture and the time noted from yield strength to fracture the average rate of strain in the plastic range of strain may be determined with a fair degree of accuracy."

Mr. Hathaway: I offer in evidence the bulletin just referred to by the witness, as Plaintiffs' Exhibit 15, an article entitled "An Investigation of the Effect of Rate of Strain on the Results of Tension Tests of Metals", by Paul G. Jones and H. F. Moore.

(The paper so produced and identified was received in evidence and by the reporter marked Plaintiffs' Exhibit 15.)

Q. 57. Mr. Emery, do you have any other illustra-
37 tions of the use of clocks placed concentric with the
load indicating hand? A. Yes, in one of Olsen's catalogues, Bulletin No. 2, copyrighted in 1920, on page 21, there is illustrated a device with a dial and a load indicating hand and a clock built in, entirely concentric with the load indicating hand.

Q. 58. What is dynamometer? A. A dynamometer is just exactly what the word translated means, a force measuring instrument. The testing machine is simply one type of dynamometer. It is used for measuring forces.

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Q. 59. Mr. Emery, the Krause bulletin, on the front page, shows this dial with two hands; and you have referred to the fact that they have a maximum load hand and a loading hand.

Do you have any other illustration showing those things
to be common in the art? A. The only other one is our
38 own Southwark-Emery catalog. I don't see the date
here. I was looking to see the date—it is 1930. On
page 14 it carries this statement:

"A fine red idler hand running on a spindle held in watch-jewel bearings is carried along by the black pointer to mark the maximum load values. After the black pointer has deposited the red hand, it will fall away to the fracture point, thence back to zero."

That is just as I explained to your Honor with the model.

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Albert T. Goldbeck.

40 Albert T. Goldbeck was called as a witness on behalf of the plaintiffs.

I reside in Washington, D. C. I am Engineering Director for the National Crushed Stone Association. That association is a national association, composed of crushed stone producers throughout the United States and some in Canada; and my particular work in connection with that association is of an engineering and research nature; it has a great deal to do with the testing of materials. We test a great many different kinds of materials. I have operated practically all of the types enumerated by Mr. Emery, except the Amsler machine. I have never operated that machine.

I was graduated from the University of Pennsylvania in civil engineering in 1906. For two years following my graduation from the University of Pennsylvania I was instructor in the mechanics of materials. That involves the mathematics of materials.

Also, in the two years following that, I was in charge of the laboratory for testing materials of Lafayette College at Easton, Pennsylvania.

Then for three years I became an engineer of tests for the United States Bureau of Public Roads, at Washington, D. C.

Then for two years I was civil engineer of tests in charge of the municipal laboratory of the City of Philadelphia.

Then I became engineer of tests of the reorganized Bureau of Public Roads; and later I became chief of the division of tests of that same Bureau.

In 1925 I took my present position, that of Engineering Director of the National Crushed Stone Association.

41 Q. 8. Have you had occasion to make tests in which you desired to apply a predetermined rate of load to the specimen? A. I can think of very few tests in which I have not had occasion to apply load at a uniform rate of speed.

In testing materials the engineer of tests is faced with many difficulties, with many variables which have to be overcome, and, of course, those variables are different with different kinds of tests; but in order to eliminate as many of the variables as possible he must try to have uniformity in every operation; and of the utmost importance in testing is speed of application of load. It is highly important.

Q. 9. Now can you briefly refer to the types of machines with which you have tested and state what the difficulties were? If they were of the types which Mr. Emery referred to, it will not be necessary to give any extended description. A. Well, I can start, perhaps, with the smallest and work up to the largest. That might be a good way to do. I have worked with the cement briquette testing machines, for determining the strength of cement and cement mortar.

Q. 10. That would be the type referred to in Plaintiffs' Exhibit 13, the Olsen Catalog, on page 28? A. Yes, sir; that is one of the types. That is the long lever type.

Mr. Edwards: The last page of that bulletin, your Honor.
A. (continued) And then there is another type, referred to on page 22 of this same bulletin, commonly referred to as the shot type of testing machine.

Now, there are certain difficulties which exist in many of these testing machines. Let me refer first to the shot type of testing machine. In that machine, as Mr. Emery has
pointed out, lead shot are allowed to run out of a
42 container and the counterweight applies the load as
the shot runs into the receptacle. Now, we have found in the past that it is not always easy to apply load at a uniform rate, even with a shot testing machine. Several things happen. For instance, a little bit of grit getting into the shot will interfere with its free running. Then we have difficulty with the cut-off valve not cutting off at the proper

place and perhaps slowing down the shot. In operating that machine it is necessary, by means of a small hand wheel, to keep the load constantly applied, so that the balance will float in horizontal position and naturally it is rather difficult to keep that lever floating in horizontal position. It begins to oscillate and, depending on the skill of the operator, it is applied at a more or less uniform rate. If the beam begins to oscillate, you may have inertia effects coming in and giving an increased load on the specimen.

Q. 11. That would tend to give you a wrong result? A. Yes, sir. For instance, if the beam is oscillating at the time when the specimen is about to break, you may get actual breakage of the specimen at a time when that beam is moving into such position as to apply increased load. That frequently happens.

Q. 12. You have tested specimens on the type of testing machine where the speed of the frame or head piece is kept constant? A. Yes, sir. You refer to this long lever type of machine, in which the poise is run out on the weighing beam at a constant rate by means of an electric motor, and that—

Q. 13 (interposing) That is the same as the one you have just been considering, is it not?

I am referring more to the earlier type, such as the screw machine, which might be either the Olsen or the Rhiele type.

A. I also was referring to the screw type of machine,
43 but a smaller size, for testing briquettes. If you wish
to refer to the larger, multiple lever type machine, I
can describe that.

Q. 14. Yes. A. If you will consider an ordinary platform scale, and then consider that you have a specimen, we will say a specimen of concrete, placed on this scale, with an overhead screw for applying the load, you have the essentials of the multiple lever screw type of testing machine. Of course the actual testing machine is somewhat more complicated than that.

The procedure in applying the load, say to a concrete specimen, is to mount the specimen on the so-called weighing face of the testing machine; and then the moving head is brought down in contact with the specimen; and then you apply load by continuing the motion of that head. In making such tests, the usual procedure is to set the machine running at a predetermined speed, and ordinarily the machines have three speeds. Ordinarily the machine is set to run at a given speed.

As Mr. Emery has very nicely pointed out, the fact that you run that head at a constant rate of speed when the machine is unloaded does not at all mean that you are applying load at a constant rate of speed to the specimen, for several reasons—the elastic deformation of the specimen itself varies, depending upon the elastic properties of the specimen; the elastic deformation of the machine controls the rate of loading.

44 And I think of very great importance is something that has not yet been mentioned and that is the inertia effect of the lever system. The operator, depending upon his skill, keeps that in balance. He tries to keep the beam in horizontal position but is never entirely successful and the weighing beam is oscillating practically all the time. The weighing system is heavy and there is a tremendous leverage in the weighing system, which multiplies the load on the specimen. The inertia effect applies more load on the specimen than is actually indicated by the weighing system.

Q. 15. Have you had occasion to use the metronome in connection with these machines? A. Yes, sir. When we established our laboratory we bought a hydraulic machine and at that time there was no means for controlling the rate of application of load. I had been trained over many years to know the rate of application of load was highly important; and the very first thing we did in operating our machine was to get a metronome, in the effort to control the rate of load application.

My use of the metronome dated back to my old experience in the office of Public Roads, where metronomes had been used for other types of tests, for instance, the penetration test on asphalt. We used the metronome in an effort to control the rate of load application.

Now, we set up a more or less arbitrary scale to do that, based, however, on the divisions in the dial and based also on my knowledge of how fast this load should be applied; and we arbitrarily established the rate, such that the hand would move over one main division of 1,000 pounds in four seconds time. That was in making tests on concrete cylinders. But in making beam tests, such as made in
45 connection with concrete highways, we had to slow down that rate, and we slowed it down so that the hand moved over a division of 100 pounds in four seconds. Well, the operator would endeavor to make his four seconds coincide with the motion of the hand across the main division of the dial, but he had quite a time of it. He was not at all successful. At times his hand would arrive at the main divisions before the four seconds were up, indicating that it was applying the load at too rapid a rate. And so then he would slow it down, but he would have to wait until the next four beats were up before he could find out how successful he was. So we had a great deal of difficulty in applying the load at the desired rate.

Q. 16. Was it recognized that that method would introduce some error? A. It is recognized that any lack of coordination in the rate of load application produces error.

I do not know to what extent the metronome has been used as a means of controlling the rate of load application; but we probably did the best we could in establishing a uniform rate.

Q. 17. Do you know of others using it? A. No, sir; not personally; I have never known of others using the metronome for that purpose.

Q. 18. If you are using the metronome and happen to miss one of the ticks or the scale divisions, then what happens? A. Well, I would try to catch it up in the next four beats. I would manipulate my load control valve in an effort to make it come out even with the main division of the dial. Then I would be ready to start all over again. Frequently that was impossible; it might take three or four
46 groups of four beats before we could establish a point where they coincided.

Q. 19. Have you used a Baldwin-Southwark type machine in which there is a rate of load hand? A. Yes; I have.

Q. 20. Does that avoid the troubles and errors to which you have referred? A. Yes, sir; in my opinion it avoids them entirely.

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Duff A. Abrams.

Duff A. Abrams was called as a witness on behalf of the plaintiffs.

I reside in New York City. I am a consulting engineer. I graduated in civil engineering from the College of Engineering of the University of Illinois in 1909.

Q. 5. Would you just state briefly the positions you have held and your occupations between that time and the present time? A. 1905 to 1914 I was employed as an assistant and research associate of the engineering experiment station at the University of Illinois. During that time I was engaged entirely in carrying out tests of materials of construction; and these tests included the following: cement, concrete, reinforced concrete, bond between concrete and steel, tests of brick and terra cotta columns and walls,
47 tests of brick and terra cotta and of various types of
steel members, timber, reinforced concrete structures, such as buildings and bridges.

1914 to 1925 I was professor in charge of the structural materials research laboratory at Lewis Institute in Chicago. Here 25 to 40 employees were under my direction in carrying out studies of cement, concrete, and concrete aggregates.

In 1926-27 I was director of research for the Portland Cement Association, Chicago, engaged in work similar to that which I had carried out at Lewis Institute.

In 1927-31 I was director of research of the International Cement Corporation, New York City, engaged in studies of cement and concrete.

In 1931 to date I have been engaged in consulting engineering work, specializing in cement, concrete, concreting methods and so forth.

Q. 6. You are a member of various scientific societies and engineering societies? A. I hold membership in the American Society for Testing Materials; and I have been a member of their technical committees probably 25 years. I now hold membership in Committee C-1, Cement; Committee C-9, Concrete and Concrete Aggregates; Committee C-6, Drain Tile; Committee E-1, on Methods of Testing. On the latter committee I am a member of the sub-committee on the effect of speed of testing.

Q. 7. I have here a copy of pages 646 and 647 of the proceedings of the American Society for Testing Materials, held on June 20 to 24, 1927. Will you take this and say if you are a member of the committee referred to here?
48 A. This report is entitled "Progress Report of Research Committee on Yield Point of Structural Steel."

Q. 8. That purports to be the report of a research committee on the yield point of structural steel, I believe, and you were a member of that committee? A. I was not a member of that committee; no, sir.

Q. 9. Were you a member of a committee of that Society for Testing Materials in which you had occasion to use or to investigate the speed of load application? A. I have been a member of Committee E-1 for possibly 20 or 25 years. I do not recall exactly when that committee was organized. I believe, however, that I was one of the charter members and I am still a member of that committee. This committee is a kind of round-up committee, you might say, of testing methods in the entire society. All methods which are proposed must be approved by this committee before they become official; and I have had occasion to study this problem of speed of testing.

In fact, in 1917 I published in the same journal there, the Proceedings of the American Society for Testing materials, a report on the effect of rate of application of load on the compressive strength of concrete. I think that was probably the earliest study of that kind that was ever carried out.

Q. 10. Now, at the time of writing this paper did you have occasion to make tests which involved the rate of load application and to investigate the effect of rate of load application to the specimens? A. We realized very early that the rate of application of the load was an important factor. The higher the rate, the faster the rate, the higher the strengths are. It was in the endeavor to find out what this effect was with reference to concrete specimens that
49 these tests were carried out. We were endeavoring
to arrive at a standard procedure. The rate of application of the load was known to be important and we had no measure of that which was recognized procedure, and that was the purpose of these tests.

Q. 11. What devices or methods did you follow in obtaining a rate of load application which would be constant or as near constant as you could make it? A. The only method we could use was to drive the moving head of the machine at a uniform rate. That, however, did not apply a uniform rate to the specimen, as shown in that report.

Q. 12. When you say "did not apply a uniform rate", you mean a uniform rate of loading? A. A uniform rate of loading; that is correct.

Q. 13. What did it apply? A. We had determined that when the moving head was running at the rate of .05 inches per minute, that the actual movement with reference to the concrete specimen itself, under load, was only about .01 inches per minute; in other words, that the rate of application of the load was only a quarter or one-fifth what we had assumed it to be.

Q. 14. In writing papers or reports did you take account of any error caused by that? A. We determined what the effect was by using a series of different rates; but we had no way of controlling the rate of load in any case. We simply took what we got and ascertained what the effect was. We found with a more rapid rate of application the strength was 20 to 25 per cent higher than it was at the very slow rate. Naturally, that is an extremely important item.

Q. 15. Those tests, then, would mean that you would recognize that there would be some error in the individual tests? A. Yes; there would be error in the individual tests.

Q. 16. Was there any known way of overcoming it? A. No, sir; there was no known way of overcoming it at that time.

Q. 17. Have you seen the Baldwin-Southwark machine with the rate of load hand? A. I have and I have operated them.

Q. 18. Does that solve the troubles so far as you know? A. It solves the troubles perfectly, in my opinion.

Q. 19. Now, in your early tests did you have occasion to use the metronome or watch in trying to get a constant rate of load application? A. I have never made use of the metronome. I did make use of a stop watch, however, in determining these rates that we recorded in that 1917 report which you have before you. That, however, it should be made clear, did not enable us to apply the load at a predetermined rate. We simply determined what the rate was and that was accomplished in a very laborious fashion by dismantling the machine and putting various sizes of pulleys and belts to operate the machine.

Mr. Edwards: I will offer in evidence copy of proceedings of the twentieth annual meeting of the American Society for Testing Materials, held June 26-29, 1917, consisting of the title page and pages 366 to 375, inclusive, being the paper referred to by the witness. I shall not at this time review that, but I may read quotations from it in argument. I will ask that that be marked Plaintiffs' Exhibit 19.

(The document so produced and identified was received in evidence and by the reporter marked Plaintiffs' Exhibit 19.)

Mr. Edwards: That is all.

Mr. Cochran: I have no questions.

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Francis G. Tatnall.

Francis G. Tatnall was called as a witness on behalf of the plaintiffs.

51 A. I reside in Philadelphia, Pennsylvania. I am associated with the Baldwin-Southwark Division of the Baldwin Locomotive Works. I have been in charge of sales for that company from the time of its existence as the Testing Machine Division of Baldwin Locomotive Works, since it started in 1926. I am familiar with the machines made by that company with the rate of load pointer as disclosed in this Blanks application, here in controversy. That type was put upon the market in 1934 which is as far back as I can recall.

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Q. 11. Now, how many of them have been sold by the Baldwin-Southwark Company since that time? A. That is the testing machines with the rate of load indicator on them?

Q. 12. Yes. A. Well, I made a notation here, 321 machines up to the present date.

52 Q. 13. What can you say that would give us some idea as to whether 321 machines means anything at all as to the reception by the public, or use? A. 321 machines—in the first place that means 557 dials; but I would say that that—since 1934, inclusive, that would be about 33⅓ per cent of all the testing machines sold by us. I have a record here of all the machines sold by our company. The 33⅓ per cent is the machines with the loading control. Those that carry that particular loading control device represent about one-third of all the testing machines sold by us; and that, in turn, represents, I should say, about 90 per cent of all the machines sold in this country.

A. What I will say again is this, that if we have sold 321 machines with loading controls on them, I should say that we have probably sold 600 without loading controls. That is dating from 1934, which is my first record; but the percentage has been increasing. With us there has been a continually greater number sold with loading controls on them, as the years went on. It started very slowly in 1934 and picked up gradually up to the present year, whereby, I should say at the present time, now, practically all the machines carry loading control on them.

Q. 20. What proportion of all the machines sold by all the makers, including the Baldwin-Southwark, does that number constitute? A. I should say that that number would constitute about one-fourth of all the machines sold by all three domestic companies; that is leaving out the foreign companies, such as the Amsler and the German manufacturers—Amsler being Swiss.

53 Q. 21. Is there any field in which this has found special favor? A. Yes; it has found special favor in the field dealing with cement, concrete, asphalt, building materials.

Q. 22. How many have been sold in that field and since when? A. Well, since 1934 I would say practically every machine sold for use in that field has carried a load control, practically every machine. It has been practically universally adopted. There may have been one here and there which I have no mental record of.

Q. 23. You mean the machines bought from the Baldwin-Southwark Company or from the Baldwin-Southwark Company and all others? A. The Baldwin-Southwark Company and all others, yes.

In accordance with the way the testing situation has arisen it is practically impossible to sell them without that type of control, in that particular field.

Q. 24. So far as you know, is that the only machine on the market in which it is possible to adjust the rate of load application and control it? A. Yes; it is.

But let me go back just a moment. Mr. Emery and the other witnesses have talked about mechanical machines, screw type power versus hydraulic. In the screw type of machine it is impossible to have an automatic control of rate of load. Therefore, the screw power machine, as a result, has practically disappeared from public buying. All the competitors have shifted over from screw type machines to the hydraulic.

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54 A. The situation right now is that the most active controversy that is taking place right now in the testing society on materials is the effect of rate of load.

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Q. 28. What kind of controversy and by whom? Tell us what it is. A. It is not a controversy as to whether we should have the uniform rate of loading so much as it is a controversy as to whether or not the specifications of the American Society for Testing Materials shall carry the requirement for rate of loading or a requirement for rate of straining, which can be indefinitely referred back to crosshead motion.

Q. 29. Do I understand that the Baldwin-Southwark Company manufacture other types of machines and that this use of the rate of load control is now standard? A. This use of the rate of load control, beginning this year, is now standard.

Q. 30. Why the "beginning this year"? A. Because this controversy has led up to such a high pitch of excitement in the industry that we felt it would be highly desirable to
increase our sales in that field and that to put this
55 on standard and at least get the jump on our competitors. Obviously, it is things of this kind that give one company a lead over another—to be the first to do this thing.

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Q. 33. You say the American Society for Testing Materials recommended it? A. They recommended it very strongly; and then people began to think about it.

56 The various committees dealing with concrete products immediately took the practice up and had tests

made at the National Bureau of Standards, among others. A great many tests were made at the Bureau of Standards, and showed that the effect of rate of loading affected the results of the tests. As a result, under the leadership of the National Bureau of Standards, and under the leadership of the Portland Cement Association, and the various public authorities, the Tennessee Valley Authority, the Bureau of Public Roads, and others, rate of loading control became requisite, although not covered in the specifications, but requisite in the best practice—and other people testing concrete, building materials, asphalt, and cement, in compression.

Mr. Goldbeck here had something to do with that.

Q. 34. Who opposed it? What was the controversy? A. It was very few who opposed it.

Q. 35. Very few opposed it? A. The controversy was that a greater proportion of people over a period of 50 years had been using the mechanical machines, which they had bought and paid for. When they used the mechanical machines they could not operate by rate of loading. They had to operate by so-called idling speed of the crosshead.

Therefore everybody with a mechanical machine stood up and objected to adopting the method which required a hydraulic machine. It is just a matter of dollars and cents.

Gradually the purchases of hydraulic machines began to increase, so that every time anyone got a hydraulic machine they began to change, to favor it, and we have a con-
stantly increasing number favoring the hydraulic
57 machine, until we can see the active opposition dying
out, though I can say it is the most active controversy going on in materials testing circles today.

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Spencer B. Michael.

Spencer B. Michael was called as a witness on behalf of the plaintiffs and testified: I live in Washington, D. C. I am a patent attorney and have had occasion to make searches in the prior art for the purpose of anticipating or finding out what is in the prior art with respect to patents.

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The general course of procedure is to search the United States patents in the art relating immediately to the subject matter in question; and then to expand the search ino the analogous fields in the United States Patent Office; and then to carry the search into the available classified patents of the foreign countries; and, if necessary, carry it further, into the field of periodicals and textbooks.

Q. 5. I show you a copy of the Plaintiffs' Exhibit
58 14 and ask you if, at my request, you made inquiry
at the libraries where you usually look in making searches and other libraries, to see if you could find a copy of that bulletin in any of the libraries. This is the Krause bulletin, which forms Exhibit A of the depositions. A. Yes. You did give me a copy of this catalogue and ask me to make inquiries and searches at the local libraries and also at others, to see if I could find it. I searched at the scientific library of the Patent Office, the Congressional Library, the library at the Bureau of Standards, the Free Library of Philadelphia, the Public Library in New York City, and the libraries of the engineering societies in New York City; and at none of these libraries was I able to locate a copy of this particular pamphlet.

Q. 7. In making a search for anticipations, within your experience, is it customary to look for trade bulletins or leaflets? A. It is not customary to make such a search.

Q. 8. So far as your information goes, are these bulletins of a character that go to all of the public? A. I would say no.

Q. 9. And to what class of people normally would they be sent, in your opinion? A. It is generally my understanding that they are sent to those particularly interested in that line of endeavor which is represented by the catalogue, probably prospective purchasers of such material.

Decision of Mr. Justice Bailey Filed November 20, 1940.

61 I think that the foreign catalogue circulated in the trade, relied on by the defendant is a "printed publication" within the meaning of Section 4886 R. S. Imperial Glass Co. vs. A. H. Heisey & Co., 294 Fed. 267.

I agree with the decision of the Board of Appeals of the Patent Office, and the complaint should be dismissed.

BAILEY
J.

62 *Findings of Fact filed December 11, 1940.*

1. This is an action brought under Section 4915 R. S. (U. S. C., title 35, sec. 63) in which plaintiff, Baldwin-Southwark Corporation assignee of patent application No. 637,298, filed by Robert F. Blanks on October 11, 1932, entitled "Materials Testing Equipment", seeks to have the Court authorize the defendant, the Commissioner of Patents, to issue to plaintiffs a patent containing claims **1 to 9, inclusive, 19, 20, 22 and 23 of said application.**

2. The application for patent of the plaintiff Robert F. Blanks relates to an apparatus for testing the strength of materials by subjecting them to gradually increasing loads. The apparatus includes a pivoted hand movable over a dial for indicating the load which is being applied to the test specimen. It is desirable in testing materials that the load be applied at a constant predetermined rate. To aid in operating the apparatus in this manner there is provided another, independently driven hand which is pivoted
63 concentrically with the previously mentioned load hand, and is caused to move at a constant rate equal to the desired rate of application of the load. In operating the apparatus, the operator controls the application of the load in such manner as to make the load indicating hand keep pace with the other hand moving at a constant rate. The application of the load at the desired constant rate is thus accomplished. The apparatus includes means for

manually resetting the hand which moves at a constant rate and also means whereby said hand may be driven at different constant rates.

3. The prior art upon which defendant relies as anticipatory of the claims in issue is a leaflet issued by Ernst Krause & Co. A-G, in Vienna, Austria. The leaflet discloses a materials testing machine which is generally of the Amsler type as shown in Plaintiffs' Exhibits 11 and 17. It discloses a manometer having a pivoted hand movable over a dial. The text of the leaflet states:

> "For measuring of a desired testing speed (in accordance with acceptance regulations of the German Railroad), a time clock is used which is built into the pendulum scale. The hand of the clock is arranged concentric with the hands of the scale".

4. It is within common knowledge that clocks are provided with means for manually setting the hands and means for adjusting within narrow limits the rate of running.

5. The Krause leaflet bears no date, but the evidence shows that the leaflet was distributed to interested parties early in the year 1930 at a time more than two years before the filing of plaintiff Blanks' application.

Conclusions of Law

1. The Krause leaflet is a printed publication within the meaning of Sections 4886 R. S. and 4887 R. S. (U. S. C., title 35, secs. 31 and 32).

2. Claims 1 to 9, inclusive, 19, 20, 22 and 23 of plaintiff Blanks' application recite nothing patentable over the disclosure made in the Krause leaflet.

3. Plaintiffs are not entitled to a patent containing any of said claims.

4. The complaint should be dismissed, with costs against the plaintiffs.

JENNINGS BAILEY,
Justice.

Judgment Filed December 11, 1940.

65 This cause having come on to be heard and having been tried in open court and argued by counsel for the respective parties upon the pleadings and proofs adduced and submitted to the Court,

It is Adjudged this 11th day of December, 1940, that the complaint in this case be, and the same hereby is dismissed with costs against the plaintiff.

JENNINGS BAILEY,
Justice.

Approved as to Form:
JOHN B. BRADY
Attorney for Plaintiffs.

Notice of Appeal Filed December 26, 1940.

66 Notice is hereby given that Baldwin-Southwark Corporation and Robert F. Blanks, plaintiffs above named, hereby appeal to the Court of Appeals of the District of Columbia from the final judgment dismissing plaintiffs' bill of complaint entered in this cause by the United States District Court for the District of Columbia on December 11, 1940.

CLIFTON V. EDWARDS
JOHN B. BRADY
Attorneys for Plaintiffs

Dated December 26, 1940.

Assignment of Errors Filed December 26, 1940.

67 Now come the plaintiffs in the above entitled cause and file the following assignment of errors upon which they will rely upon their prosecution of the appeal in the above entitled cause from the decree made by this honorable Court and entered on or about the 11th day of December, 1940:

1. The Court erred in dismissing the plaintiffs' bill of complaint.

2. The Court erred in not granting the relief prayed for in the bill of complaint.

3. The Court erred in holding that a leaflet issued by Ernst Krause & Co. A-G in Vienna, Austria disclosed the subject matter of claims 1 to 9 inclusive, 19, 20, 22 and 23 of the Blanks application 637,298 filed October 11, 1932.

4. The Court erred in holding that the said Krause leaflet was distributed to interested parties early in the year 1930, or at any time more than two years before the filing of the said Blanks application.

68 5. The Court erred in holding that the said Krause leaflet is a printed publication within the meaning of Sections 4886 R. S. and 4887 R. S., U. S. C. Title 35, § 31 and 32.

6. The Court erred in holding that the said Blanks application recites nothing patentable over the disclosure made in the said Krause leaflet.

CLIFTON V. EDWARDS
JOHN B. BRADY
Attorneys for Plaintiffs

Dated December 26, 1940.

Memorandum

December 27 - 1940.

Bond of Plaintiff for Costs for $250.00—filed.

Plaintiff's Exhibit 3—Translation of Krause & Co. Leaflet.

321 ERNST KRAUSE & CO. A-G.

Vienna XX/2
Engerthstrasse 151
Budapest, Prague

Berlin W 8
Franzosischestrasse 13-14
Cologne, Warsaw

Factory: Donauwerk, Brunewerk

Hydraulic Universal-Material Testing Machine—Model MP 4

For Tension, Compression, Buckling, Bending, Folding, Shearing, Punching and Brinell Tests, Chain and Spring Tests, Creep Tests, etc.

Maximum Loading—40,000 Kg.
Packing Free, Ground Piston, Shock Absorber
Load Indication by Pendulum Scale

Testing Speed Adjustable, in accordance with regulations of the German Railroad

(Illustration 1. Normal Execution with Electric Drive and Storage Battery)

Outstanding Features

No foundation required; small set-up space required; easy to transport; no appearance of free forces; simple operation by handpump; electric motor and storage battery; clear vision of load tests by pendulum scale with three (3) test ranges; only one operator required; high efficiency (40 tons—88,184 lbs.); great versatility; finest regulation of testing speed.

322 *Our Hydraulic Universal-Material and Tensile Testing Machine Model MP 4*

is according to the principle of the hydraulic press constructed with a packing free piston. The load definition is established through pendulum scales. The machine has a capacity for tension and compression tests as high as

40,000 Kg. (88,184 lbs.) and consists essentially of a pump, a press cylinder; a pendulum scale for *direct* reading of loading and power transmitting mechanism.

The *press cylinder* is made of high grade, especially fine grain cast steel.

Press piston and cylinder have a ground finish. The pistons travel freely with only an oil film between piston and cylinder wall, thus producing only liquid friction. This friction value is, at all pressures, constant and disappearingly small, and is already balanced when engine is gauged at our Works.

The *pump body* is made of solid steel. As a pressure liquid, a good resin and acid-free mineral oil is used.

Power reading: A pendulum scale is used for reading of expended power. This pendulum scale has three (3) test ranged of 1 to 4,000 Kg. (8,818.4 lbs.); 0 to 12,000 Kg. (2,645.5 lbs.) and 0 to 40,000 Kg. (88,184 lbs.) The pendulum scale is not subjected to any wear and contains no parts endangered to overstrain, thus insuring correct power reading after longest time of operation.

(Illustration, Fig. 2 Folding Strength)

For measuring of a desired testing speed (in accordance with acceptance regulations of the German Railroad), a time clock is used which is built into the pendulum scale. The hand of the clock is arranged concentric with the hands of the scale.

Diagram Recording Instrument. There is a diagram recording instrument direct solidily connected with the pendulum scale which permits a graphic registration of the power progress dependent upon the ductility. (Tensile test diagram).

Manual operation. Machines with equipment for manual operation allow a piston of variable effective area a quick traversing of dead travel before test begins, inasmuch as the piston of the machine per stroke of the large pump piston is lifted about 4 mm. When working with the small pump piston, that is, during the regular test, the travel of the machine piston amounts to 0.4 mm per stroke.

Electric drive. If the machine is desired with an 323 electric drive, a worm drive will be installed in the foot of the frame. The motor is then attached to a swinging support which is mounted to the pedestal of the machine so that besides the actual weight of the machine, no power action toward the outside occurs.

Storage battery. A valuable completion of the electric drive is the storage battery. This storage battery is tested to a multiple of actual working pressure and is equipped with a safety valve against overloading. The danger of exploding is impossible. The storage battery in its capacity as power accumulator, considerably raises the output of the machine in connection with finest regulation and quick procedure of tests at completely shock-free loading gradation.

An electric drive is always required for machines equipped with a storage battery. If necessary, a machine equipped with electric motor could be operated manually also.

Precision. After machine is completed, the power registration of the machine is calibrated in accordance with the most accurate procedure known (calibrating with gauge rods of the Staatliche Material Pruefungsamtes (Federal Material Testing Bureau) in Berlin-Dahlem and Martens' schem Spiegel Apparat—Illus. 5). We guarantee from a total load of 3% of the capacity of the engine an accuracy of 1%.

Tension tests. Besides testing of standard test pieces and standard short test pieces with the Universal grips, as shown in Illustration #3, other tests may be made when using supplementary adapters which we can furnish at any time for testing of proportional test pieces, shoulderless flat test pieces and round test pieces. The Universal grips which are of perfected design, permit easy and quick clamping and removal, also a constant observation of the test. When using the precision test instrument the elastic limit and proportional limit can be determined.

Impression Hardness tests. Such tests can be made without any alteration on the machine, which is especially suitable for the normalized Brinell test. We supply a Brinell microscope (illustration #4), for determination of the diameter of the ball impression, which has a special calibration for immediate reading of the ultimate tensile strength.

Folding and bending tests. Folding tests are possible to an angle of 180°. Bending test to a free bending length of 1,000 mm. (39.37″). Illustration #2 shows the folding test; similar is the bending test, only lower supports are used for this test.

Grip support. The upper crosshead carries on two tie rods the upper grip head, which is freely held in a spherical cup of the press piston, resulting in a swinging support of
the upper grip head without any guide in the frame,
324 thus assuring a central alignment of the test piece
and therefore the elimination of all disturbing additional strains.

Adjustable columns. These columns are manually adjustable by means of a chain operating a worm and worm gear and permits use of full height of machine for every test purpose; for instance, abnormally long and irregular test pieces.

Compression and buckling tests. These can be made with all materials used in the building and machine industry. It is noteworthy that the press cylinder, due to its construction, is completely protected from any dust entering it.

Punch tests and depth impression tests. These are for the judgment of the machinability of materials and are very valuable. These tests can be carried out without much work, with the use of simple fixtures.

Shear tests. They give information of the shear resistance which cannot be directly determined from the tensile strength. A special grip device is so constructed that the bending strain is completely eliminated.

Our special catalog describes all the above listed varieties of tests in every detail.

The machine is approved by Lloyd's Register of Shipping, London—German Lloyd—Bureau Veritas.

Several hundred machines are in use in all Europeon and overseas states and work very satisfactorily in university laboratories, large plants of private industries, in State industries, arsenals, railroad shops, etc.

Dimensions:

Maximum loading	40,000 Kg.	(88,184 lbs)
Stroke	250 mm	(9.842″)
Largest distance between grip heads	850 mm	(33.46″)
Largest distance between compression plates	720 mm	(28.347″)
Largest free bending length	1,000 mm	(39.37″)
Largest height of machine	3,250 mm	(127.94″)
Weight with standard equipment, approximately,	1,200 kg.	(2,645.9 lbs)

All machines are built on production basis, using jigs and fixtures. All shafts, pins, etc. are ground in accordance with tolerance standards (D. I. Normen) (German Industrial Standards).

All machines are calibrated with up-to-date Government calibrated instruments and their precision complies with the strictest regulations of the Government testing laboratories.

(Figs. 4, 5 and 6 shown)

325 (Fig. 7. Material Testing machine Model MP for all tests with device for chain tests (Patent) equipped with three (3) tubular spring scales)

Standard equipment:

1 Differential plunger pump (by manual operation equipped with variable effective piston area).

1 Grip device for test pieces of 20 mm (0.7874″) diameter, consisting of:

1 upper and one (1) lower slide
2 sets of hardened and ground cup inserts, and
2 sets of hardened and ground spherical washers.

1 Standard test piece, 20 mm (0.7874″) as sample
1 Extensiometer
1 Device for simple compression tests up to 40,000 Kg. (88,184) pounds), consisting of:
  1 lower and one (1) upper ball socket guides with hardened and ground ball sockets
1 Insert for Brinell test, with ball of 10 mm (0.394″) diameter.
1 Brinell-Microscope for measuring of the ball pressure diameters, with a millimeter scale to 7 mm (0.276″) and a special division scale for direct reading of ultimate tensile strength for iron and steel samples of 35 to 100 Kg. (77.16 to 220.46 pounds) tensile strength with level plate and operating instructions. One set of wrenches, Brinell hardness table. One general instruction book.

If equipped with pendulum scale, also furnished:

1 Pendulum scale for 3 test ranges: 0-4000 Kg. (8,818.4 pounds); 0-12,000Kg. (2,645.5 lbs.); 0-40,000 kg. (88,184 lbs.), with diagram recording instrument including 1,000 sheets of diagram recording paper, also time clock for setting of lead increase.
1 Electric motor—0.2 HP for the pendulum.

If equipped with tubular spring scales, also furnished:

1 Scale up to 10,000 Kg. (22,046 lbs.) and
1 Scale up to 40,000 Kg. (88,184 lbs.)

Maximum loading

1 Calibrating table for reading of actual loading.

326 *Special equipment:*

Bending appliance for strength bending test, including folding tests.

Grip device for 12 mm (0.472″) test pieces, consisting of:

2 sets of hardened and ground socket guides, grip supports, and
1 proportional test piece, 12 mm (0.472″) as sample.

1 Martens-Kennedy gauge instrument for 150 mm (5.906″) or 100 mm (3.937″) measuring length.
1 set of extension pieces for testing of short pieces, with thread forms as desired.
1 set of nuts for test pieces with thread forms as desired.
1 set of calibrating slides for calibrating with "Martin" tensiometer.
2 sets of wedges for flat material to 50 mm (1.969″) widths, i.e., from 0-5 mm (0.197″); 5-10 mm (0.197″-0.394″); 10-15 mm (0.394″-0.591″); 15-20 mm 0.591″-0.787″); 20-25 mm (0.787″-0.984″).
2 pairs of wedges for round material, i.e. from

3- 5 mm (0.118″-0.197″)
5-10 mm (0.197″-0.394″)
10-15 mm (0.394″-0.591″)
15-20 mm (0.591″-0.787″)
20-25 mm (0.787″-0.984″) thickness.

(For round material from 0-3 mm (0.118″), the wedges 0-5 mm (0.197″) can be used).

1 Appliance for shear tests on cylindrical test pieces with normally 12 mm (0.472″) diameter. If desired, 1-15 mm (0.039″-0.591″) diameter and 50 mm (1.969″) in length
1 Apparatus for punching tests.
1 raised Brinell ball support for Brinell tests in impressions, with ball of 10 mm (0.197″) diameter.

Control calibrating device to be used with instrument by the surveyor of Lloyd's Register of Shipping (instrument will be furnished).

1 Electric drive for pump, in combination with manual drive (without motor)

327 1 electric motor of 2 HP at approximately 1,400 R. P. M.

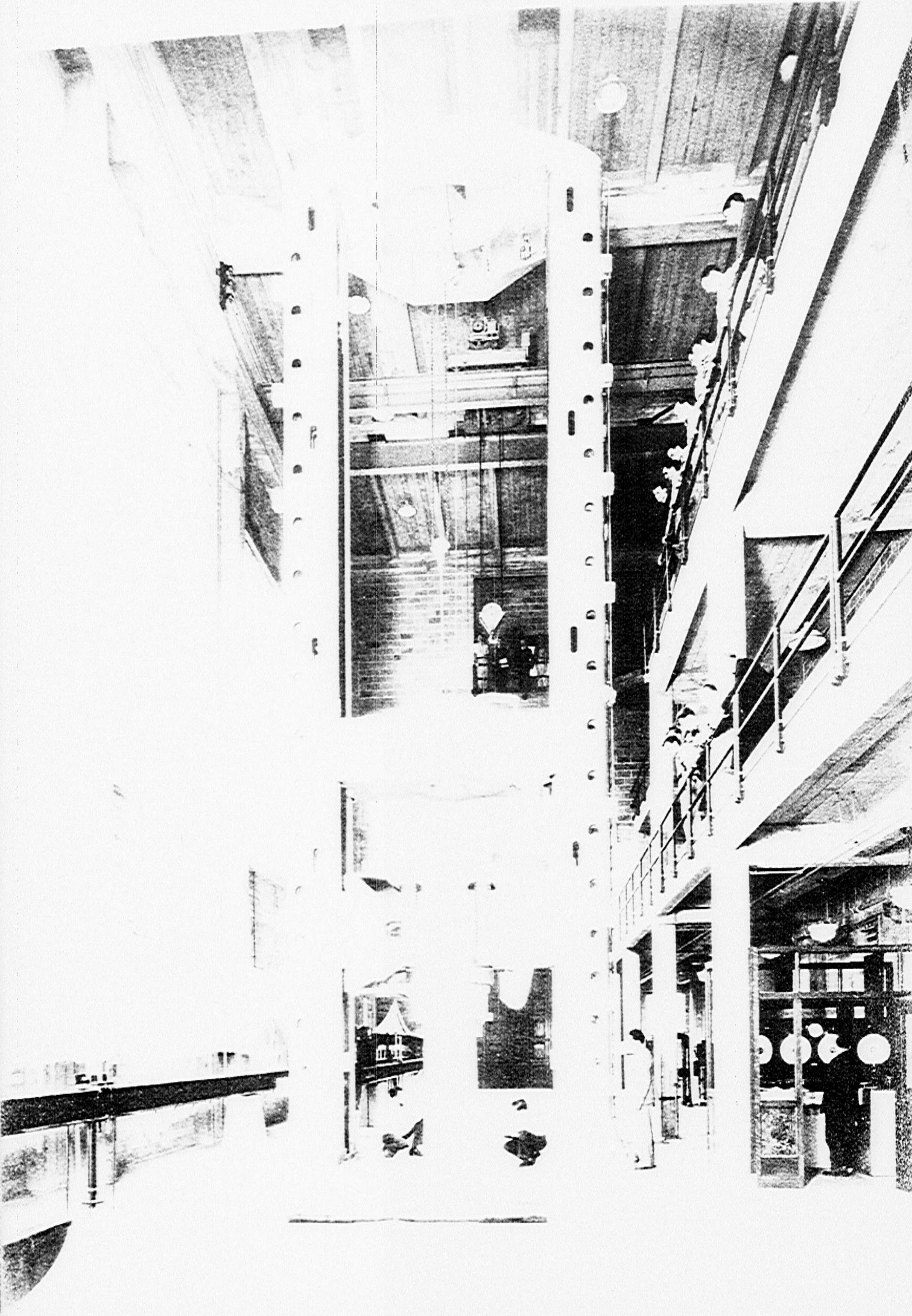
1 storage battery (the previous listed electric drive must be ordered with this. Motor 3 H.P.

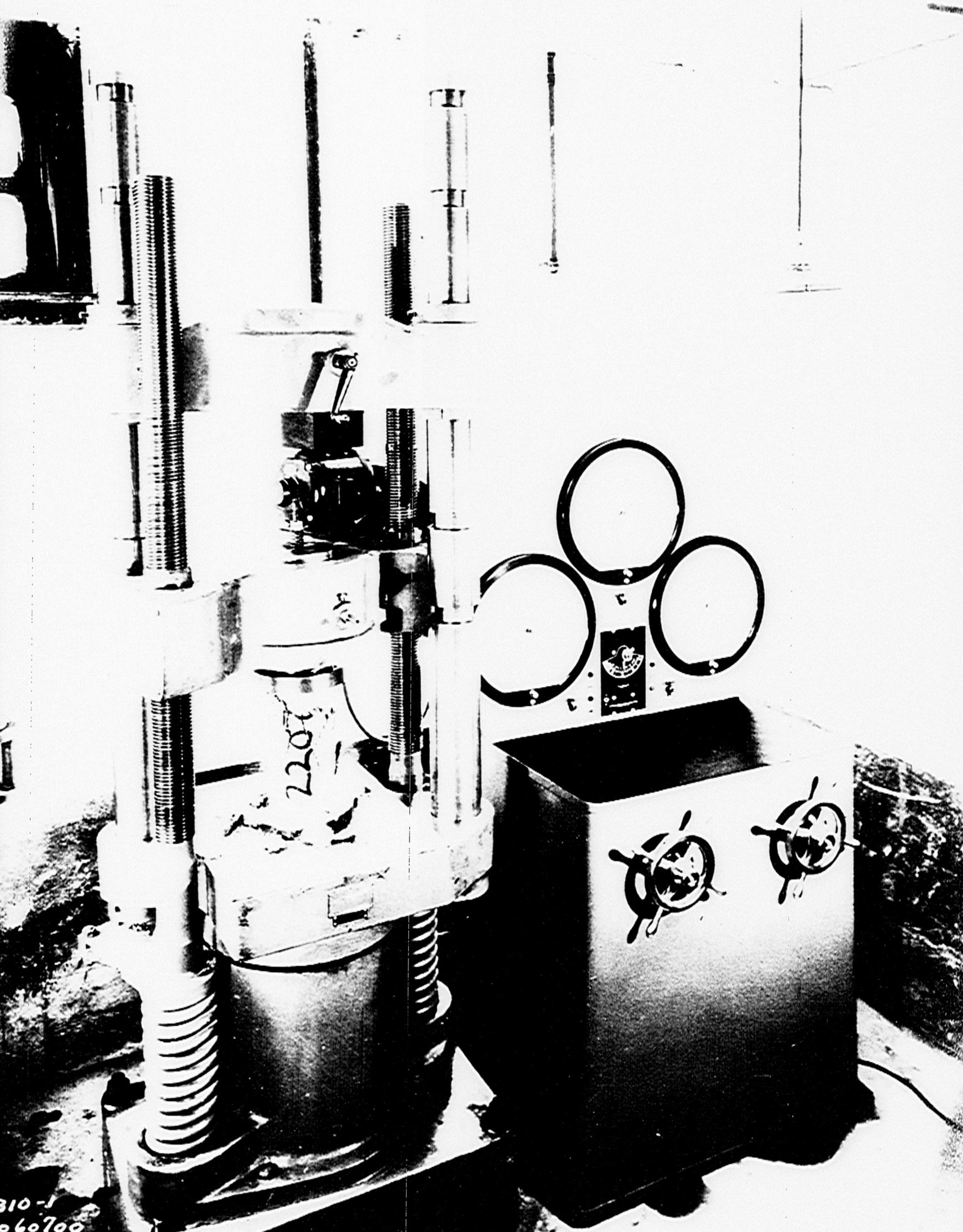
Equipment with tubular spring scales:

1 third tubular spring scale for precision reading to 2,000 Kg. (4,409 lbs.) test range.

1 diagram recording instrument with 100 sheets of diagram paper.

* * * * * * * * * *

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March 8, 1932. A. H. EMERY, JR **1,848,468**

MACHINE FOR TESTING THE STRENGTH OF MATERIALS

Filed June 13, 1929 3 Sheets-Sheet 1

FIG. III.

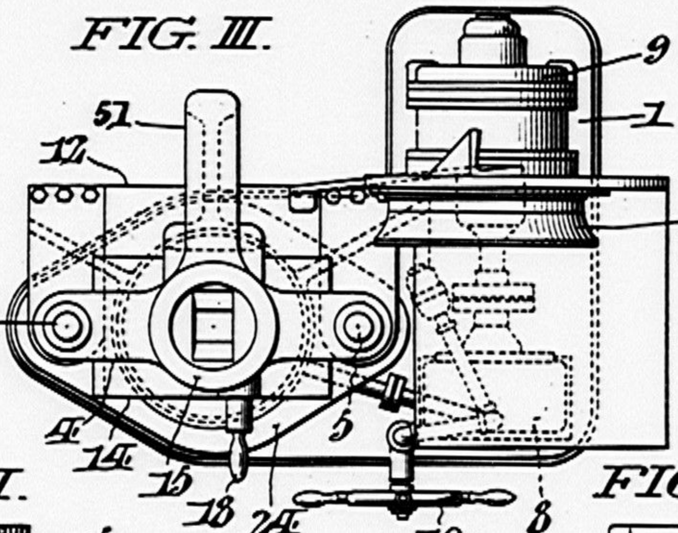


FIG. I.

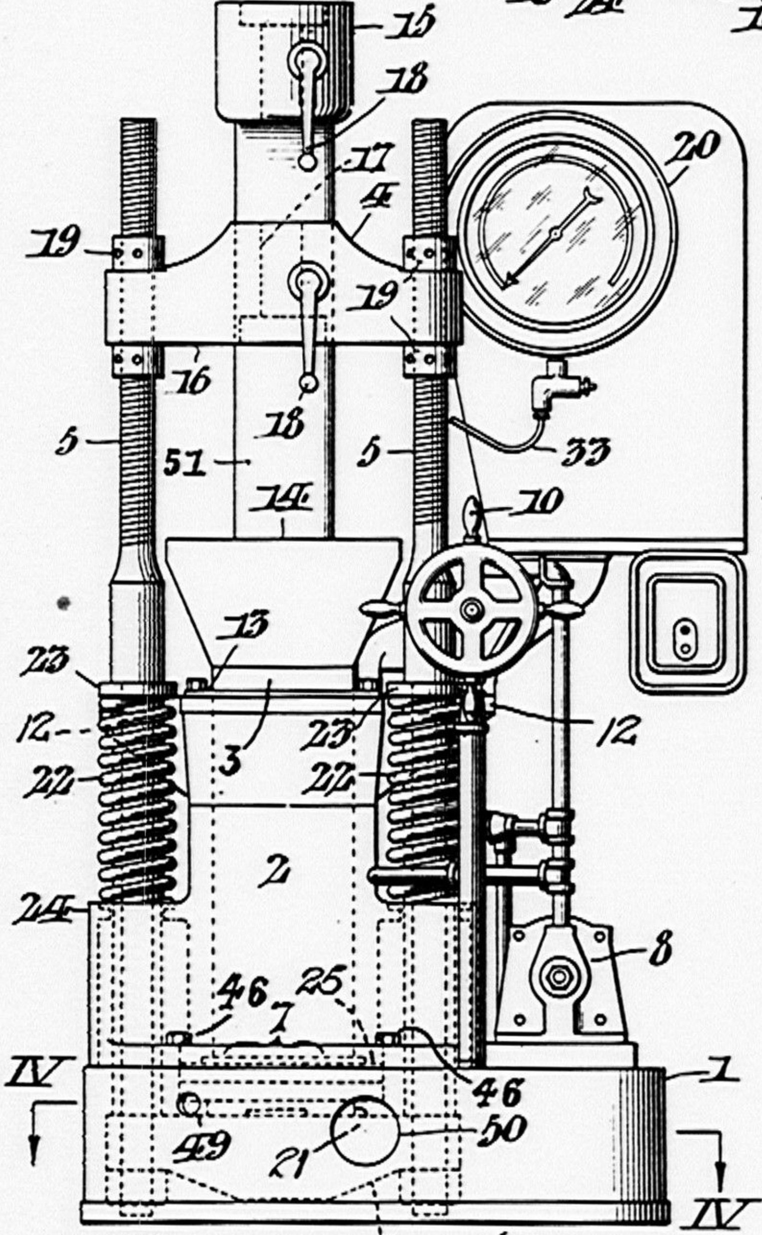
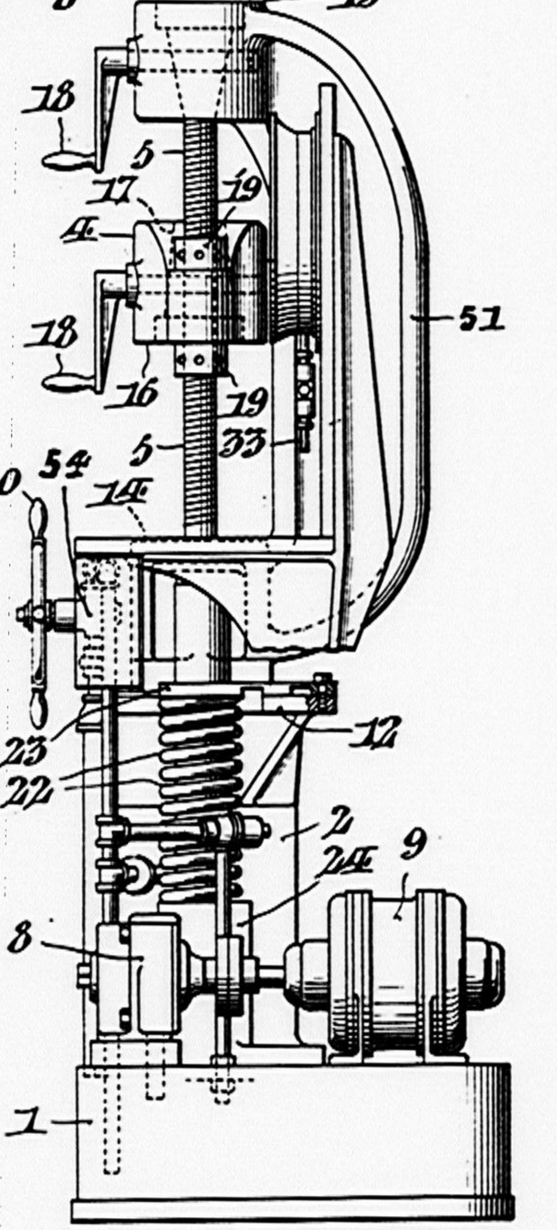


FIG. II.



WITNESSES

John A. Weidler

William Bell

INVENTOR:

Albert H. Emery Jr.

BY Fraley & Paul

ATTORNEYS.

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March 8, 1932. A. H. EMERY, JR **1,848,468**

MACHINE FOR TESTING THE STRENGTH OF MATERIALS

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FIG. V.

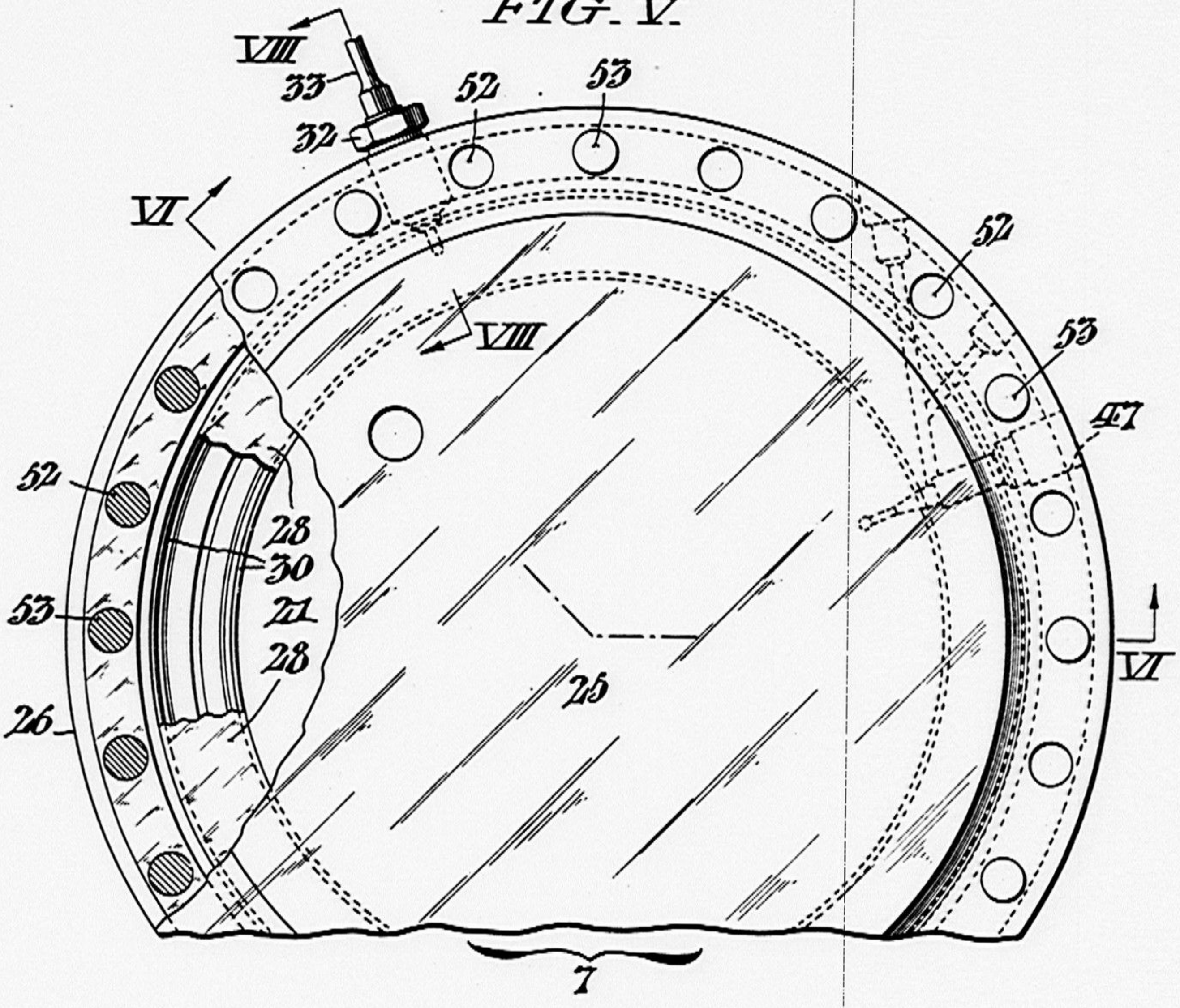
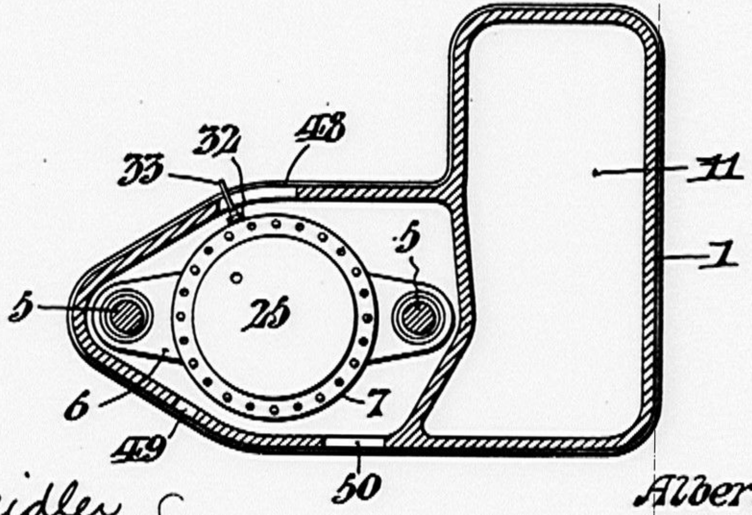


FIG. IV.



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March 8, 1932. A. H. EMERY, JR 1,848,468

MACHINE FOR TESTING THE STRENGTH OF MATERIALS

Filed June 13, 1929 3 Sheets-Sheet 3

FIG. VI

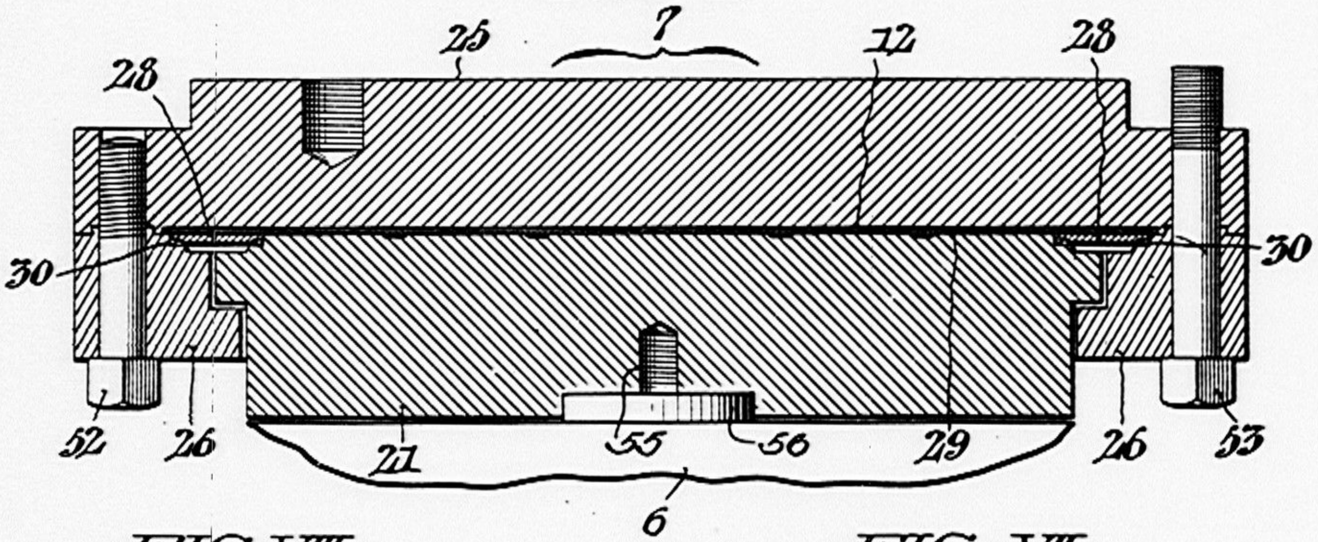


FIG. VIII

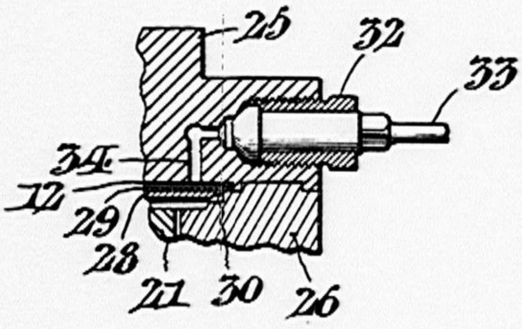
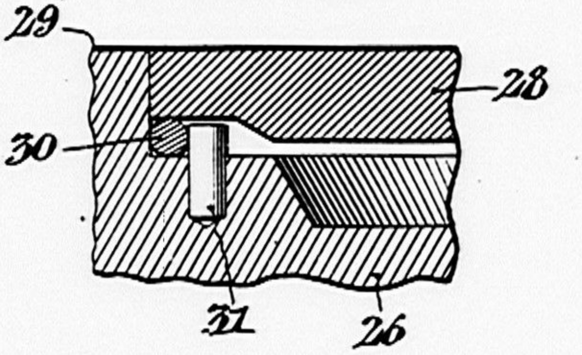


FIG. VII



WITNESSES

John A. Weidler

William Bell

INVENTOR:

Albert H. Emery Jr.

BY Fraley & Paul

ATTORNEYS.

Patented Mar. 8, 1932 **1,848,468**

UNITED STATES PATENT OFFICE

ALBERT H. EMERY, JR., OF STAMFORD, CONNECTICUT, ASSIGNOR TO EMERY-TATNALL COMPANY, OF STAMFORD, CONNECTICUT, A CORPORATION OF DELAWARE

MACHINE FOR TESTING THE STRENGTH OF MATERIALS

Application filed June 13, 1929. Serial No. 370,551.

This invention relates to machines for testing the strength of materials either in tension or in compression.

The principal object of the invention is to provide a testing machine characterized by accuracy of measurement and reliability of operation. This end I accomplish in part by the provision of separate means for stressing the specimen under test and for measuring the load, the stressing means acting upon one side of the specimen and the measuring means including a hydraulic support to which the load is transmitted from the other side of the specimen.

A more specific object of the invention is to provide in such a machine means for transmitting the load on the specimen to the hydraulic support without appreciable friction loss.

Another object of the invention is to provide in such a machine means for producing a constant pressure or initial load upon the hydraulic support preparatory to the operation of the machine.

Another object of the invention is to provide an improved hydraulic support for converting the load into fluid pressure, said support being characterized by means rendering the acting area of the support unchanging with relative movement between the column and base of the support.

Still other objects and advantages of the invention will be apparent from the detailed description which follows and which has reference to the embodiment of the invention illustrated in the accompanying drawings, whereof:

Fig. I shows a vertical front elevation of the testing machine.

Fig. II shows a side elevation of the same with certain parts broken away for clearness in illustration.

Fig. III shows a top plan view of the same.

Fig. IV shows a section of the testing machine taken along the line IV—IV of Fig. I, the hydraulic support being shown in elevation.

Fig. V shows a top plan view of the hydraulic support with a portion of its base and bridge ring broken away.

Fig. VI shows a cross-section of the hydraulic support, taken along the lines VI—VI of Fig. V, and a fragmentary portion of the yoke which acts upon said support.

Fig. VII shows an enlarged detailed view of the bridge ring of the hydraulic support and the method of supporting the same; and

Fig. VIII is a section taken on the lines VIII—VIII of Fig. V, and shows the method of connecting the pipe which leads from the support to the indicator or gage.

With particular reference to Figs. I and II, the stressing end of the machine is shown comprising generally a base 1, a hydraulic cylinder 2 resting on and secured to the base by means of bolts 46, and a piston 3 having a goose neck shaped extension 51. The scale or weighing end of the machine comprises a yoke 4, parallel columns in the form of rods 5, a cross-head 6, and a hydraulic support, diagrammatically indicated in dotted lines at 7. The details of the support are shown in Figs. V, VI, VII and VIII.

To produce the load on the specimen I preferably employ a hydraulic pump 8 driven by an electric motor 9, with suitable means such as a hand wheel 10 for controlling through a valve 54 the hydraulic pressure supplied to the base of the cylinder 2. A cistern 11 may be conveniently located in the base 1, as shown in Fig. IV, to serve as a reservoir for the hydraulic medium of the pump 8. However, the details of the pump and the manner of controlling its operation are immaterial to the invention. Likewise the details of the hydraulic cylinder 2 and the portion of the piston 3 within the cylinder are immaterial to the invention, which contemplates a variety of means for initiating the load to be produced upon the specimen. Where the piston leaves the cylinder 2, the piston is packed and guided by means of a packing gland 13.

The upper or goose neck portion of the piston comprises an integral piece provided with a load platen in the form of a platform 14 adapted to carry the specimen when it is to be tested for strength of material in compression, and an oppositely disposed load platen in the form of a holder 15 adapted to carry the specimen when it is to be tested for tensile strength. In either case the load from the stressing disposed load platen in the form of end of the machine is imparted through the specimen to the yoke 4,—in compression to the lower face 16 of the yoke, and in tension to the holder 17 in the upper part of the yoke 4. Handles for operating the grips for holding the specimen in tension are shown at 18. The grips may, of course, be of any convenient form and their details are not material to the invention.

To provide for adjustment of the yoke 4, the parallel rods 5 are threaded, and nuts 19 which are rotatable in the ends of the yoke 4 engage the threaded rods 5. By turning the nuts 19, the yoke 4 may be elevated or lowered in an obvious manner.

Formed with the casting of the cylinder 2 at its upper end is a flange 12 to which are bolted flexible stay plates 23. The stay plates 23 are recessed in two places to provide the requisite flexibility and are rigidly attached to the rods 5. They prevent any lateral movement of the rods 5 while allowing moderate movement in a vertical plane without appreciable friction, thus keeping the specimen and the rods 5 in proper alignment with respect to the stationary elements of the machine.

The rods 5 are connected at their lower ends by means of a cross-head 6 which bears directly upon the column 21, shown in Fig. VI, of the hydraulic support 7. Each rod 5 is fitted with a helical spring 22, engaging at its upper end a stay plate 23 on the rod and at the lower end a part 24 of the casting of the cylinder 2. The springs 22 serve a double purpose. They not only carry the weight of the rods 5 and the yoke 4, but they produce a constant pressure or initial load on the hydraulic support.

The details of the hydraulic support 7, which is located directly beneath the cylinder 2, are shown in Fig. VI, the support being of the general type illustrated in United States Letters Patent #918,488 to Albert H. Emery, but constituting an improvement thereon. The hydraulic support comprises generally a movable column 21, which receives the thrust or load from the cross-head 6, a base 25 which is stationary and forms the cylinder head for the cylinder 2, and an annular casing ring 26 surrounding the pressure column 21. The cross-head 6 has a circular boss 56 fitting within a correspondingly shaped recess in the center of the column 21. In the column 21 there is also shown a threaded hole 55 in which a lifting eye-bolt may be inserted for convenience in handling. The base 25 of the hydraulic support is perforated circumferentially to provide for fastening bolts 52 which hold the casing ring 26 in place and alternate longer bolts 53 for securing the hydraulic support to the cylinder 2 of the straining end of the machine. Thus the base 25 of the hydraulic support carries on its upper side the hydraulic medium for producing the load and on its under side the hydraulic medium for measuring the load. Both the column 21 and the casing ring 26 have annular recesses to accommodate a bridge ring 28. A flexible metal diaphragm 29 forms a fluid-tight connection between the casing ring 26 and column 21, at the same time allowing for moderate vertical movement of the column 21 with respect to the base 25, the diaphragm being supported by means of the bridge ring 28. The diaphragm is clamped at its periphery between the opposing faces of the base 25 and casing ring 26.

The bridge ring 28 in turn is shown supported by wire rings 30, as appears more clearly in Fig. VII, which are adjacent each edge of the bridge ring and which are held in position by means of pins 31 spaced at intervals circumferentially of the recesses of the column 21 and casing ring 26. It is most desirable that the bearing surfaces of the bridge ring be made small so as to insure a uniform acting area of the support. Heretofore, bridge rings with comparatively thin edges bearing on angular surfaces have been used, necessitating the use of very hard material to sustain the large pressure of the liquid on the bridge.

With the novel construction shown, the bridge ring may be of substantial thickness at its bearing surface, and, as the line of tangency of the surface of the bridge ring to each wire ring 30 varies within very small limits with the motion of the column 21, the bridge ring is supported on two circles of practically unchanging diameters. The rings 30 are preferably made of music wire.

The space 12 forming the pressure chamber between the column 21 and base 25 is filled with a substantially incompressible liquid and communicates with a pipe line 33 leading to the pressure gage 20. Any force on the column 21 is resisted by the liquid, and as the liquid is contained in a closed system, it produces a hydraulic pressure which is proportional to the force and to the acting area of the support. The bridge ring 28 springs under the load as the column moves slightly up or down, and the acting area of the support, being approximately the area enclosed by a circle the diameter of which is the mean diameter of the ring, does not vary with the relative position of the column 21 and base 25, as the lines of support on the faces of the bridge ring are practically unchanging as has been hereinbefore explained.

In Fig. VIII there is shown the connection 32 by which liquid from the pressure chamber 12 may flow into the line 33 to the pressure gage 20. The connection 32 is threaded and screwed into the base 25, the opening in the base communicating by means of a short passage 34 with the liquid above the bridge ring 28.

A connection for filling the hydraulic support is adapted to fit within a threaded recess, indicated at 47 in Fig. V, which communicates with the pressure chamber between the base 25 and diaphragm 29. Additional openings 56 and 57 are shown in the base 25 of the hydraulic support, these openings leading to pipe taps 58 and 59 to which connections may be fitted to provide for the filling of the pressure chamber from a different source or for a variety of other uses. As shown in Fig. IV the base 1 of the testing machine is provided with an opening 48 permitting the passage to the hydraulic support of the line for filling and the line 33 which leads to the pressure gage 20. Additional openings 49 and 50 in the front of the base 1 permit access to the hydraulic support of feeler gages and other instruments.

The operation of the apparatus will be apparent from the description herein of the functions of each element. The force exerted by the piston 3 in the hydraulic cylinder 2, governed by the pressure created in the pump 8, produces the load on the specimen. This load, however, cannot be accurately measured by the pressure at the pump because of the friction in the cylinder. To obtain an accurate measurement of the load, the measuring end of the machine, as distinguished from the stressing end includes a hydraulic support in which friction loss is negligible, and the load on the specimen is communicated to the column of the support. The load is transmitted to the hydraulic fluid in the pressure chamber of the support and to the line to the gage, the pressure in this line being directly proportional to the load.

While I have illustrated and described one embodiment of my invention in some detail, it will be apparent to those skilled in this art that changes may be made in the form of the apparatus shown without departing from the spirit of my invention, as defined in the appended claims, and that certain features of the invention may be used to advantage without a corresponding use of other features.

Having thus described my invention, I claim:

1. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, said means including a piston having a platform for carrying the specimen when in compression and having a goose neck shaped extension for carrying the specimen when in tension, a yoke interposed between said platform and holder, a hydraulic support for converting mechanical pressure into hydraulic pressure, and spring urged rods associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulic support and for producing an initial load on said hydraulic support.

2. In a machine for testing the strength of materials in tension or in compression, a hydraulic cylinder, a piston therein, said piston having a goose neck shaped extension for carrying one end of the specimen under test, a yoke to which the load is transmitted through the other end of the specimen, a hydraulic support for converting mechanical pressure into hydraulic pressure and means associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulic support.

3. In a machine for testing the strength of materials, stressing means for producing a load upon the specimen under test, said means including a cylinder and a piston operating in said cylinder; and a hydraulic support for converting the load produced upon the specimen into hydraulic pressure, said support including a movable column, a stationary base forming the head of the cylinder aforesaid and a diaphragm between said column and base.

4. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, including a cylinder, and a piston operating in said cylinder, said piston having a platform for carrying the specimen when in compression and a holder for carrying the specimen when in tension; a yoke interposed between said platform and holder; a hydraulic support for converting the load produced upon the specimen into hydraulic pressure, said support including a base forming the head of the cylinder aforesaid, and a movable column; and means associated with the yoke aforesaid for transmitting the load on the specimen to the column of said hydraulic support.

5. In a machine for testing the strength of materials in tension or in compression, a hydraulic cylinder, a piston in said cylinder, a goose neck shaped extension on said piston for carrying one end of the specimen under test, a yoke to which the load is transmitted through the other end of the specimen, a hydraulic support for converting mechanical pressure into hydraulic pressure, said support including a base forming the head of the said hydraulic cylinder and a movable column, and means associated with the yoke aforesaid for transmitting the load on the specimen to the column of said hydraulic support.

6. In a machine for testing the strength of materials including separate means for producing and for measuring the load, the load measuring means including a hydraulic support comprising a stationary base, a casing ring secured to said base, a column within said casing ring and capable of moderate movement relative thereto, a diaphragm and

bridge ring spanning the space between said column and casing ring, and wire rings for supporting said bridge ring at its inner and outer edges.

7. In a machine for testing the strength of materials including separate means for producing and for measuring the load, the load measuring means including a hydraulic support comprising a stationary base, a column movable with respect to said base, a metal diaphragm between said column and base, a bridge ring supporting said diaphragm, and wire rings for supporting said bridge ring at its inner and outer edges.

8. In a machine for testing the strength of materials including separate means for producing and for measuring the load, the load measuring means including a hydraulic support comprising a stationary base, a casing ring secured to said base, a column within said casing ring and capable of moderate movement relative thereto, a diaphragm and bridge ring spanning the space between said column and casing ring, wire rings for supporting said bridge ring at its inner and outer edges, and pins circumferentially disposed on said column and casing ring for holding said wire rings in place.

9. In a machine for testing the strength of materials including separate means for for producing and for measuring the load, the load measuring means including a hydraulic support comprising a stationary base, an annularly recessed casing ring secured to said base, an annularly recessed column movable within said ring, a diaphragm and bridge ring spanning the space between said column and casing ring, and wire rings in the annular recesses of said casing ring and column for supporting said bridge ring at its inner and outer edges.

10. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, said means including a cylinder, a piston movable in said cylinder and having a goose neck extension, a platform at one end of said goose neck extension adapted to bear upon the specimen when in compression, a holder at the other end of said goose neck extension adapted to carry the specimen when in tension, a yoke interposed between said platform and holder, a hydraulic support for converting the load produced upon the specimen into hydraulic pressure, rods associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulic support, and flexible stay plates attached to the cylinder aforesaid and adapted to guide the movement of said rods.

11. In a machine for testing the strength of materials in tension or in compression stressing means for producing a load upon the specimen under test, said means including a platform adapted to bear upon the specimen when tested for strength in compression, and a holder for carrying the specimen when tested for tensile strength; a yoke interposed between said platform and holder, a hydraulic support for converting the load produced upon said specimen into hydraulic pressure, and spring urged rods associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulc support and for producing an initial load upon said support.

12. In a machine for testing the strength of materials in tension or in compression stressing means for producing a load upon the specimen under test, said means including a platform adapted to bear upon the specimen when tested for strength in compression, and a holder for carrying the specimen when tested for tensile strength, a yoke interposed between said platform and holder, a hydraulic support for converting the load produced upon said specimen into hydraulic pressure, spring urged rods associated with the yoke aforesaid for transmitting the load upon the specimen to said hydraulic support, and flexible stay plates for guiding the movement of said rods.

13. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, said means including a cylinder, a piston movable in said cylinder and having an extension including oppositely disposed load platens, one of said platens affording a platform adapted to bear upon the specimen when tested for strength in compression, and the other platen affording a holder adapted to carry the specimen when tested for tensile strength, a yoke interposed between said load platens, a hydraulic support for measuring the load, and means associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulic support.

14. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, said means including a load platen adapted to bear upon the specimen when tested for strength in compression, and a load platen for carrying the specimen when tested for tensile strength, a yoke interposed between said platens, a hydraulic support for converting the load produced upon said specimen into hydraulic pressure, means associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulic support, and means for producing an initial load upon said support.

15. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, said means including a load platen adapted to bear upon the

specimen when tested for strength in compression, and a load platen for carrying the specimen when tested for tensile strength, a yoke interposed between said platens, a hydraulic support for converting the load produced upon said specimen into hydraulic pressure, said support including a stationary base and a movable column, a cross head bearing upon said movable column, rods connecting the yoke aforesaid with said cross head, and springs for producing an initial load upon said movable column through said cross head.

16. In a machine for testing the strength of materials in tension or in compression, stressing means for producing a load upon the specimen under test, said means including a load platen adapted to bear upon the specimen when tested for strength in compression, and a load platen for carrying the specimen when tested for tensile strength, a yoke interposed between said platens, a hydraulic support for converting the load produced upon said specimen into hydraulic pressure, columns associated with the yoke aforesaid for transmitting the load on the specimen to said hydraulic support, means for producing an initial load upon said support, and flexible stay plates for guiding the movement of said columns.

In testimony whereof, I have hereunto signed my name at Stamford, Conn., the 8th day of June, 1929.

ALBERT H. EMERY, Jr.

PLAINTIFF'S EXHIBIT No. 8 - Encyclopaedia Britannica, 9th Ed., Vol. XXII, published 1887.

Page 596: -- The ultimate strength for any one mode of stress, such as simple pull, has been found to depend on the time rate at which stress is applied; this will be noticed more fully later (Sections 28-34). --

Page 598: -- 28. In testing a plastic material such as wrought-iron or mild steel it is found that the behaviour of the metal depends very materially on the time rate at which stress is applied. --

Page 599:

33. In the testing of iron and steel the time during which any state of (pull) stress (exceeding the original elastic limit) exists affects the result in two somewhat antagonistic ways. It augments extension, by giving the metal leisure to flow. This may be called the viscous effect. But, on the other hand, it reduces the amount of extension which subsequent greater loads will cause, and it increases the amount of load required for rupture in the way which has just been described. This may be called the hardening effect. When a piece is broken by continuous gradual increment of load, these two effects are occurring at all stages of the test. If the viscous effect existed alone, or if the hardening effect were small, the material would show to greater advantage as regards elongation, and to less advantage as regards ultimate strength, the more slowly the load were applied. Tin and lead may be cited as materials for which this is the case. But when the hardening effect is relatively great, as in iron and steel, the material shows less elongation and a higher breaking strength the more slowly it is tested. An excellent illustration of this is given by the following experiment of Mr Bottomley. Pieces of iron wire, annealed and of exceptionally soft quality, when loaded at the rate of 1 lb in 5 minutes, broke with 44¼ lb and stretched 27 per cent. of their original length. Other pieces of the same wire, loaded at the rate of 1 lb in 24 hours, broke with 47 lb and stretched less than 7 per cent.[3] Again, it has been found that an excessively rapid application of stress (by the explosion of gun-cotton) makes soft steel stretch twice as much as in ordinary testing.[4] The case is very different, however, if the material has been previously hardened by strain. It does not appear that such variations in the rate of loading as are liable to occur in practical tests of iron or steel have much influence on the extension or the strength, great as the effects of time are when the metal is loaded either much more slowly or much more quickly. In fig. 15 the results are shown of tests of two similar pieces of soft iron wire, one loaded to rupture in 4 minutes and the other at a rate about 5000 times slower.

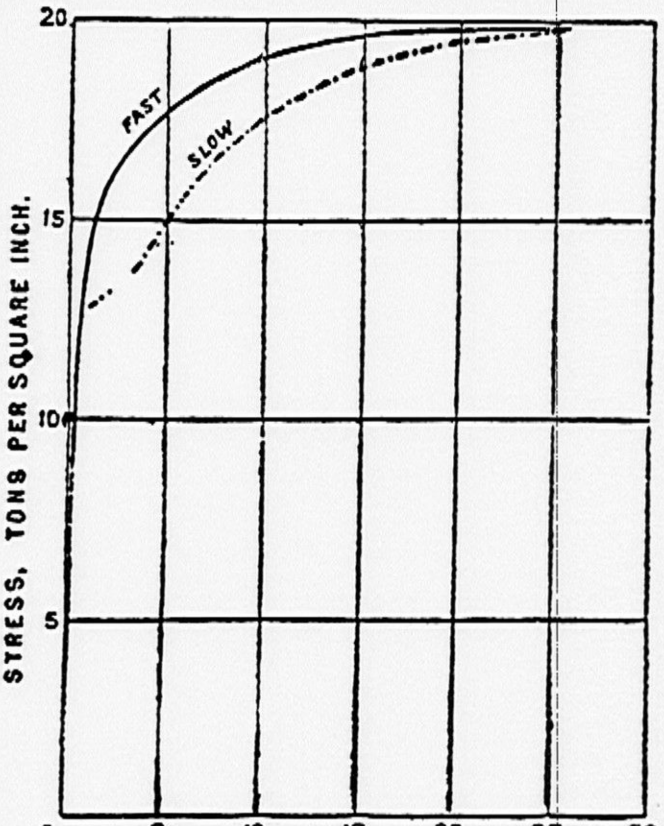


Fig. 15.

Plaintiff's Exhibit 9 Testing Materials for the Constructor by Adolf Martens, Vol. 1, Published by John Wiley & Sons, New York, 1899.

347 *g. Effect of Speed in Tests of Resistance.*

282. The question of effect of rapidity of production of deformation on results of tests has been repeatedly touched upon, that is, on the value of stress and the proportional limit, yield-point, and maximum load, or upon the value of elongation and contraction. This question is of course of the greatest practical importance in testing materials.

283. Recalling what has been said (53) about the behavior of magnesium under tension-test, the fact that there is very considerable residuary extension after each load applied intermittently, which occurs with different rapidity, decreasing at first, but increasing with increasing loads, must permit us to conclude that speed of testing must affect results of tests.

284. There must be intermolecular motion during deformation, and individual elements must assume new positions to make permanent deformation possible. After having become familiar with the adjective "flow, flow-phenomena," it will not appear strange to regard the solid body, to a certain extent, as a very viscous liquid. This can be illustrated at any moment by testing materials which are transitionary between the solids and liquids. Pitch behaves as a solid and is brittle under a load quickly applied; it breaks like glass with conchoidal fracture. If lumps of pitch be placed in a vessel and left untouched for some time, they will change their shape and ultimately unite into one mass, to form a surface just like a liquid. If the vessel be then inclined, the pitch will run out in a couple of weeks, as though poured out, although the flowing thread would show the brittleness of a solid if it were attempted to change its shape suddenly.

285. Toughness or internal friction of the liquid must be overcome if its particles are to be set in motion. If the particles are to move faster, acceleration of motion will be

produced by increased pressure. The occurrences in a solid may be conceived to be quite similar. A certain force is requisite to overcome internal adhesion, ultimately producing rupture. If it is to occur in a shorter period of time, it will be necessary to accelerate the flow of particles by adding additional force.

This consideration is convincing that a greater load must be applied to produce identical deformation in a shorter period of time, and as $\frac{L}{a} = S$, greater stress must be produced in the test-piece.

286. It is, however, questionable whether this increase of stress is of such magnitude that it is noticeable for the practical purposes of testing. Many tests have been made to answer this question, of which I shall only refer to the more extended series of Bauschinger (*L 160*), of Fischer (*L 161*), and to a few made by myself.

287. Diagrams obtained from tension-tests of sheet zinc are like those in Fig. 203. If parallel strips be tested in tension, and at three different speeds v, v_1 and v_2 three different curves, which are very similar, will be obtained (*L 115*). Stress will increase with speed. In case of zinc the tensile strength S_m may be doubled by increasing the speed. Fischer (*L 161*) proved similar results for tin.
Hence reports of tests of these materials are as good
348 as valueless for judging their quality unless obtained
under identical speed, and unless they are at the
same time stated.

288. If iron and steel be tested similarly, ordinary machines will not permit the determination of any effect of speed unless a very great number of tests be made of identical material, because the differences of strength of pieces, cut side by side from the same sheet, are generally so great that the effect of speed lies within these errors. The differences in resistance obtained by slow and rapid tests can only be determined by machines of proper construction when tests are made on one and the same piece to determine

whether more rapid rate of flow requires a greater load on the weighing-machine.* Not every scale is suitable for this purpose.

In order to make the test in the manner indicated, by sudden change of speed during the test of a bar, without material error, the masses of the weighing mechanism should be small, and it should not be so constructed that the weighing mechanism may assume the function of the straining mechanism; i.e., to load the test-piece in a manner not contemplated.

289. If the weighing mechanism has too great a mass, the inertia will affect the functions of weighing mechanism during a change of straining-speed, and the results will have to be carefully tested and corrected in this respect. Very small masses result from the use of springs as load-indicators (*65, e*).

290. If, however, a spring such as a spiral spring, which has great motion when relieved, be employed for this purpose, its indications could not follow sudden changes of speed of straining mechanism. The test-piece would continue to be strained by the spring under sudden arrest of the straining mechanism, until the spring had been sufficiently relieved, that its force could no longer produce strain of the bar; hence the intended straining-speed would not be equal to 0.

It will be seen that unfavorable design of spring may even produce rupture of bar without having reached the intended straining-speed 0; in the case where the travel of the spring up to release, to the tensile resistance S_r (*39*), is greater than the extension of bar at instant of rupture. Under sudden increase of rate of straining of mechanism, the straining-speed in the bar will not immediately reach the intended speed, and in fact it must travel a definite amount equal to the stress corresponding to the intended straining-speed.

If a weighing-device having a minimum motion for complete release be employed, the conditions just described will be most favorable. A steel bar under tension answers these requirements, as employed by me in a small tension machine* in the Charlottenburg Testing Laboratory (*115*), and also the device used in the 50-ton machine (*L 162,* Pl. 5) which I constructed for the same Laboratory.

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*See (110, c).

291. If a strip of zinc be tested in a machine of this type, and alternately strained fast and slow by driving the machine fast or slow, the diagram recorded will assume the approximate shape shown in Fig. 204. At the moment of change of straining-speed v_1 to the lesser speed the pencil will drop instantly, and then records that part of the curve marked v, and again rising with equal promptness to line v_2 under change of speed from v to v_2, etc., etc. The differences in ordinates thus directly give the effect of straining-speed on the results of tests. In case of tin, zinc, and similar metals it is very considerable.

292. If iron or steel be tested in a similar manner, the breaks in the diagram will be hardly noticeable. The effect of speed will hardly amount to 1 to 1.5% according to
349 the tests of iron thus far made by me. Bauschinger
(*L 160*) has confirmed the effect of speed on tests of zinc and a few other metals, and demonstrated that it may be neglected in case of practical tests of materials of construction.*†

---

*This bar elongates 0.024 in. (0.62 mm) under maximum capacity of the machine $L = 2200$ lbs. (1000 kg).

*I should like to call particular attention to the fact that conclusions refer to the behavior of the material alone, and not to the behavior of the testing-machine. This is quite a different matter, and my experience has been that the speed is a material factor in the results of tests made on all multiple-lever machines. The precise amount of this effect has not been determined. Remembering that straining speeds of more than 25% per minute are now in common use in England and the United States, the problem is quite a different one from that discussed in the above by the author, and by the investigators referred to, who, all of them, use machines which cannot be operated at more than moderate speeds. The 2200-lb. machine referred to cannot be operated at any great speed.—G. C. Hg.

†Having referred this matter of effect of speed to Prof. Martens, he requests me to emphasize that such speeds as are in common use in England and the United States (15-25% elongation in one minute) must undoubtedly produce a noticeable effect; and also that his and Bauschinger's tests were made with speeds very materially lower than the above. Formerly 1% per minute was the rule at the Charlottenburg Testing Laboratory; it is now about 2% per minute. Under these conditions alone the above statement is admissible.—G. C. Hg.

293. This is a matter of very considerable importance in testing materials, as no great importance need therefore be attached to maintaining a definite straining-speed in routine testing. In fact, tension-tests are nowadays made in a few minutes. It is, however, desirable that the public testing laboratories adhere to the rule adopted by several of them to use definite straining-speeds. A strain of 1% per minute has thus far been customary; but it may be necessary to adopt 2% per minute, because otherwise tests will become too tedious and expensive.

294. What has been stated relating to tension-test is no doubt equally true of all other tests of resistance. In these the influence undoubtedly exists (*218*), but it has been thus far studied but slightly.

Although numerous investigations of the influence of straining-speed on tension-tests have been made, the data are not only discontinuous, but also not free from objections, for reasons stated in (*288*) to (*290*), and it is very desirable that the tests be extended. Individual investigations cannot, however, be here discussed; this must be deferred to the special discussion of properties of materials.

* * * * * * * * * *

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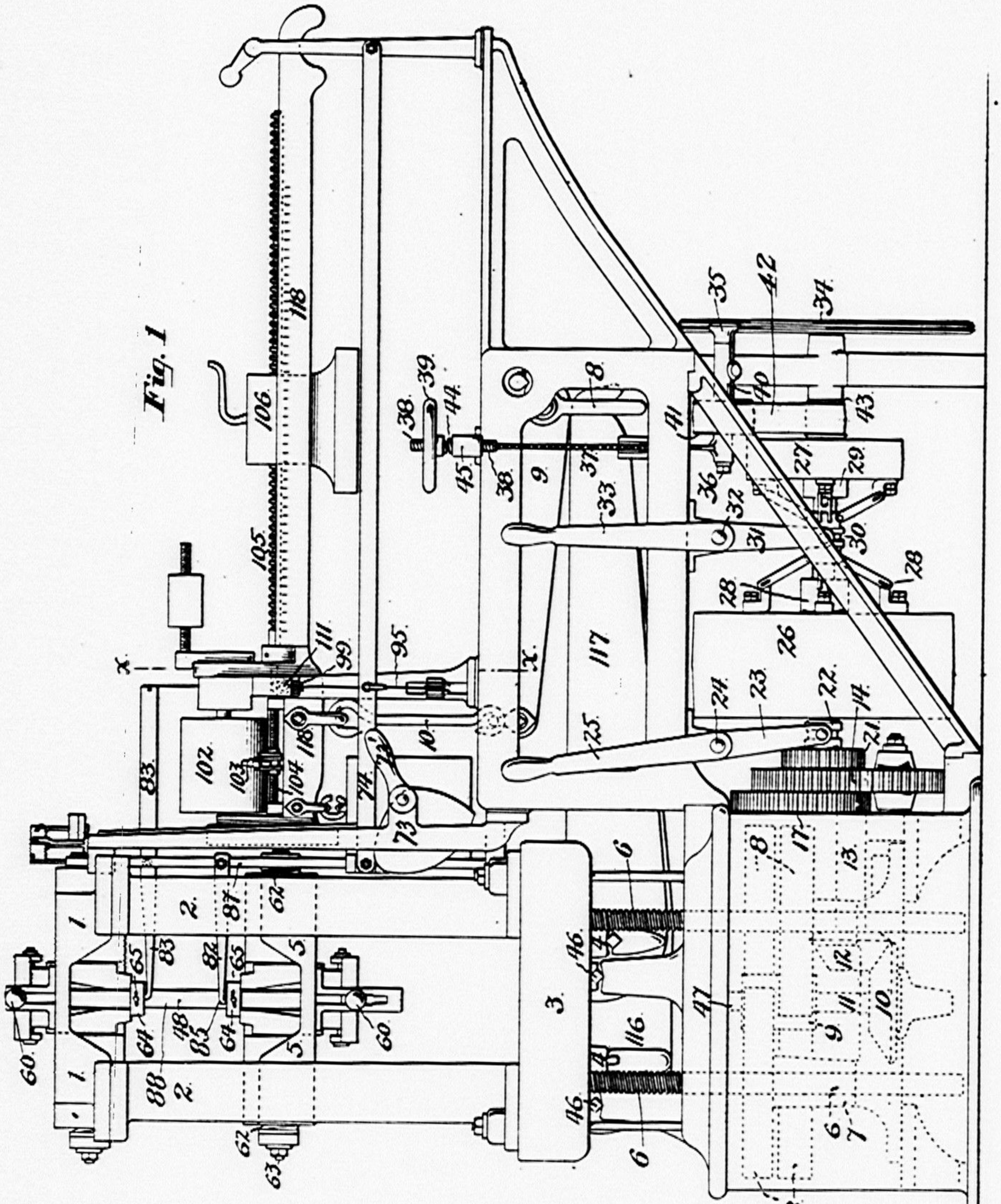
8 Sheets—Sheet 1.

T. OLSEN.

RECORDING TESTING MACHINE.

No. 445,476.

Patented Jan. 27, 1891.



Witnesses:

A. E. Paige

F. L. Goodwin

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122

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8 Sheets—Sheet 2.

T. OLSEN.

RECORDING TESTING MACHINE.

No. 445,476. Patented Jan. 27, 1891.

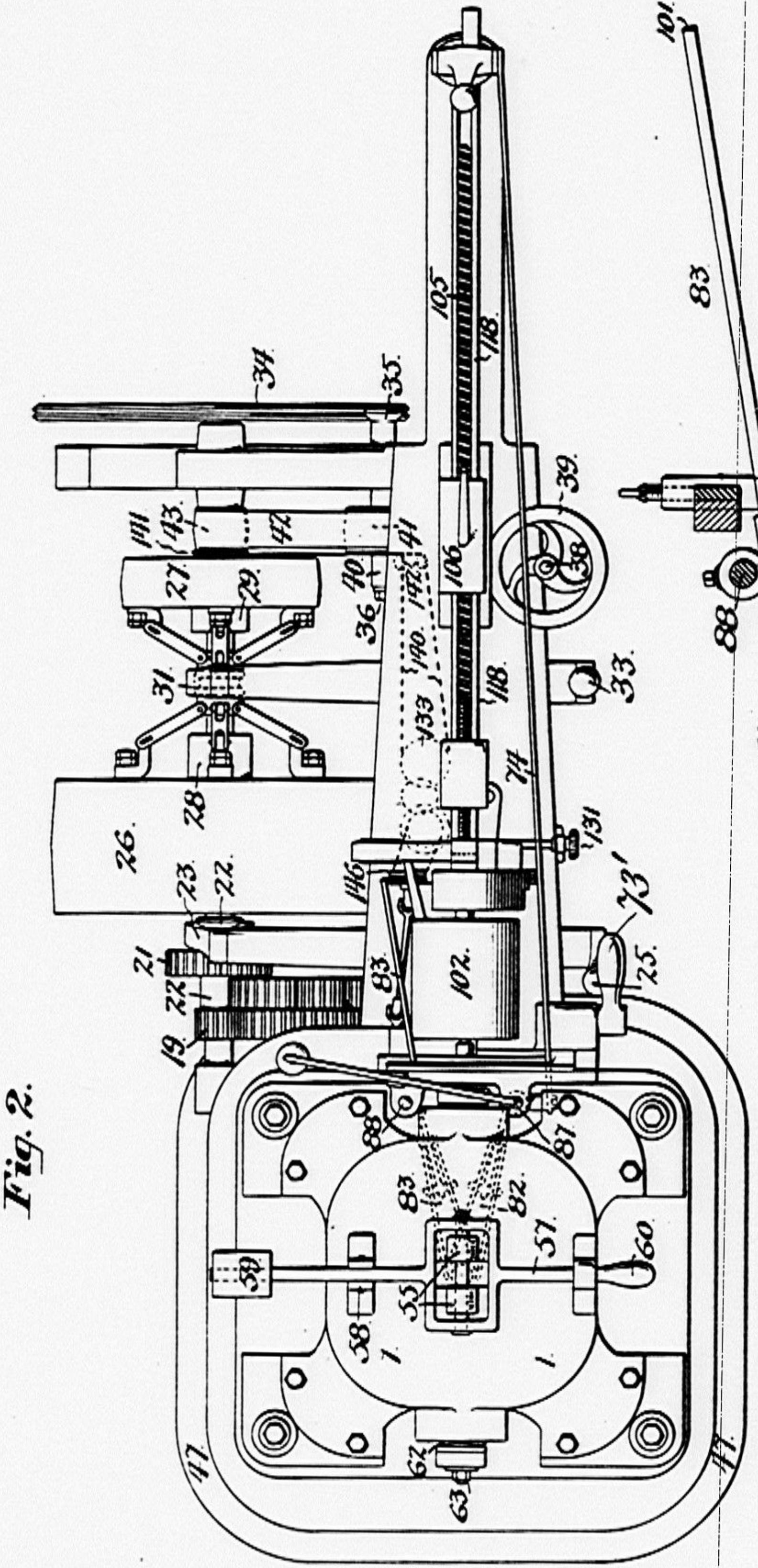

Fig. 2.

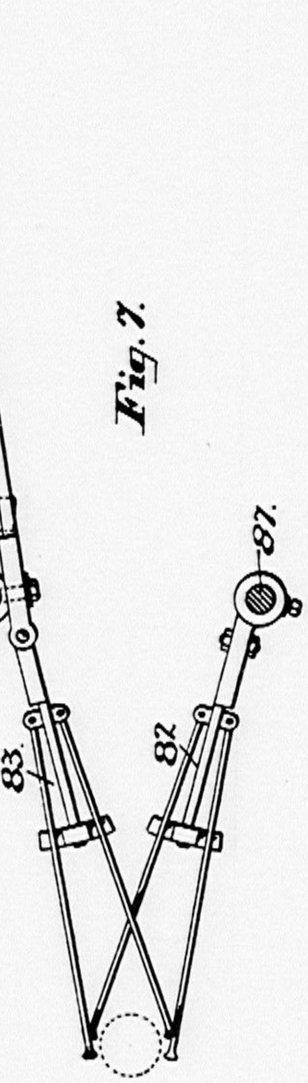

Fig. 7.

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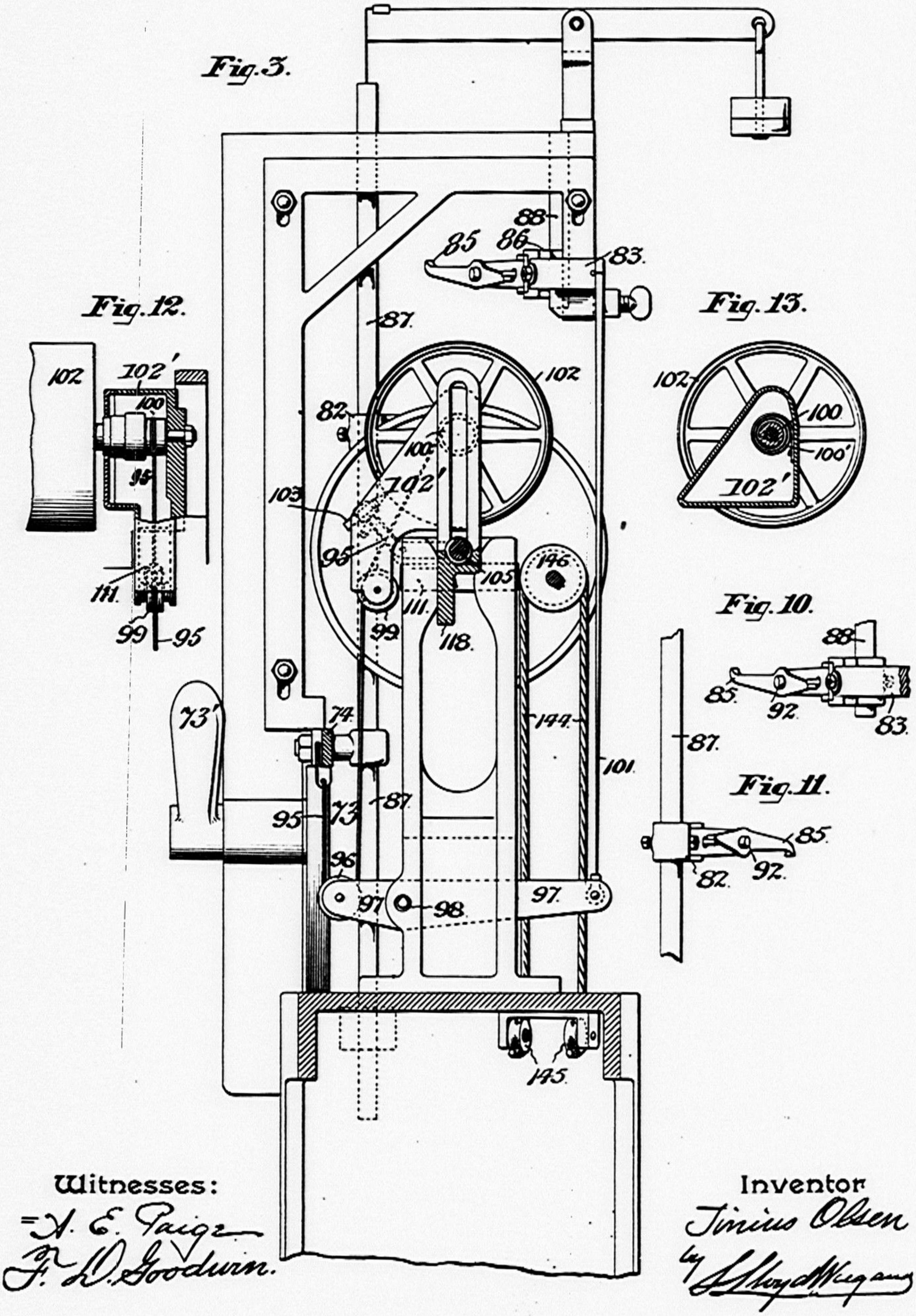

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T. OLSEN.

RECORDING TESTING MACHINE.

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Patented Jan. 27, 1891.

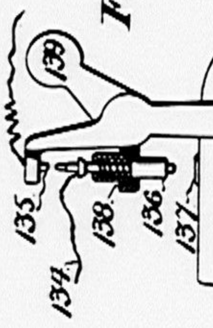
Fig. 30.

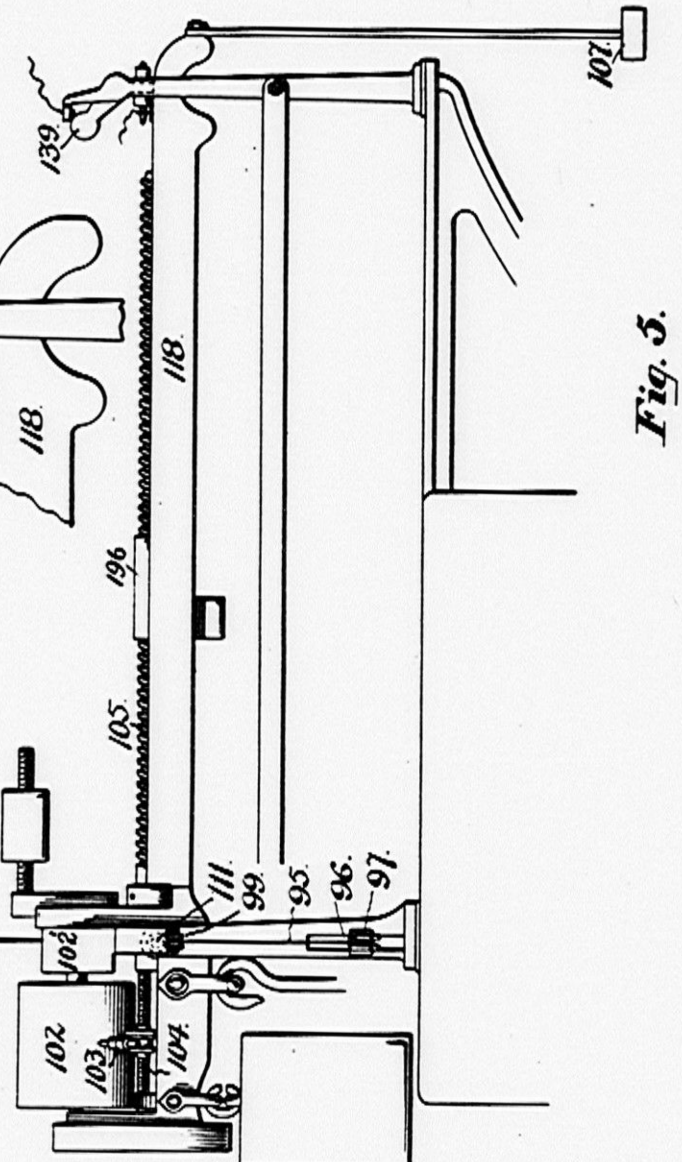
Fig. 4.

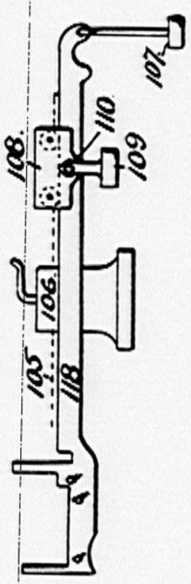
Fig. 5.

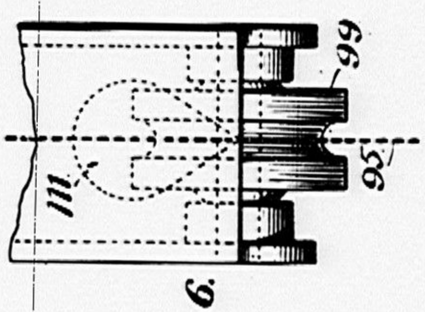
Fig. 6.

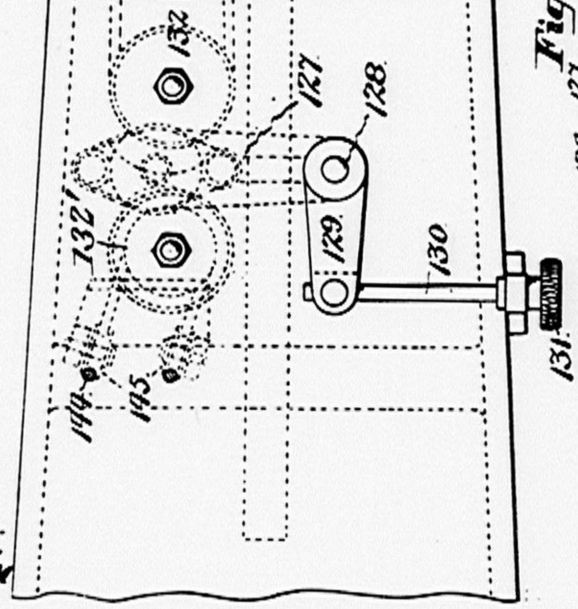
Fig. 28.

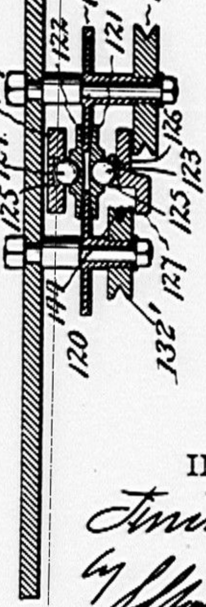
Fig. 29.

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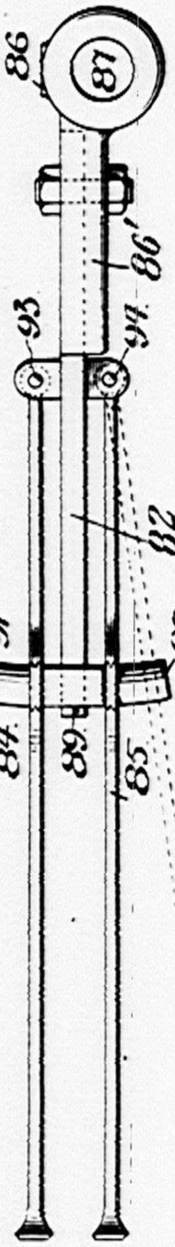

Fig. 8.

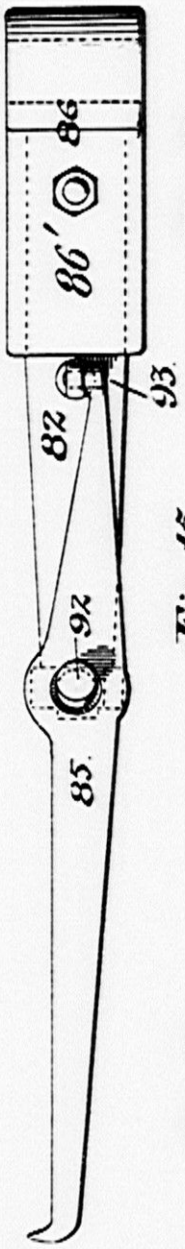

Fig. 9.

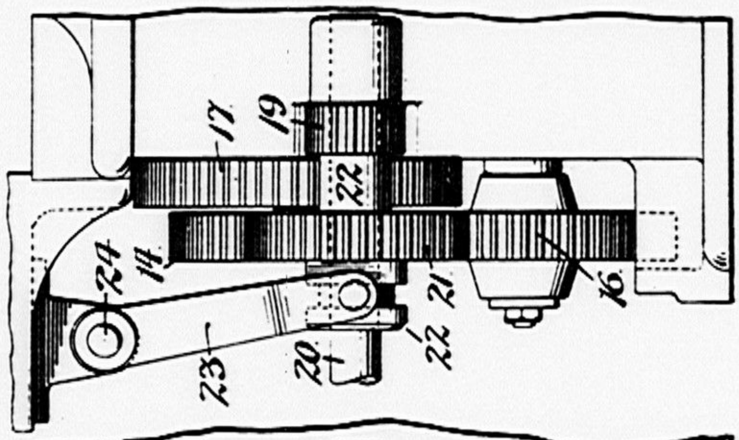

Fig. 16.

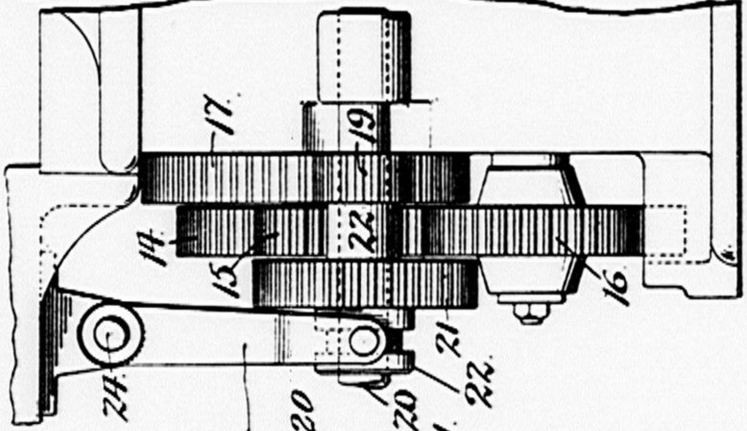

Fig. 15.

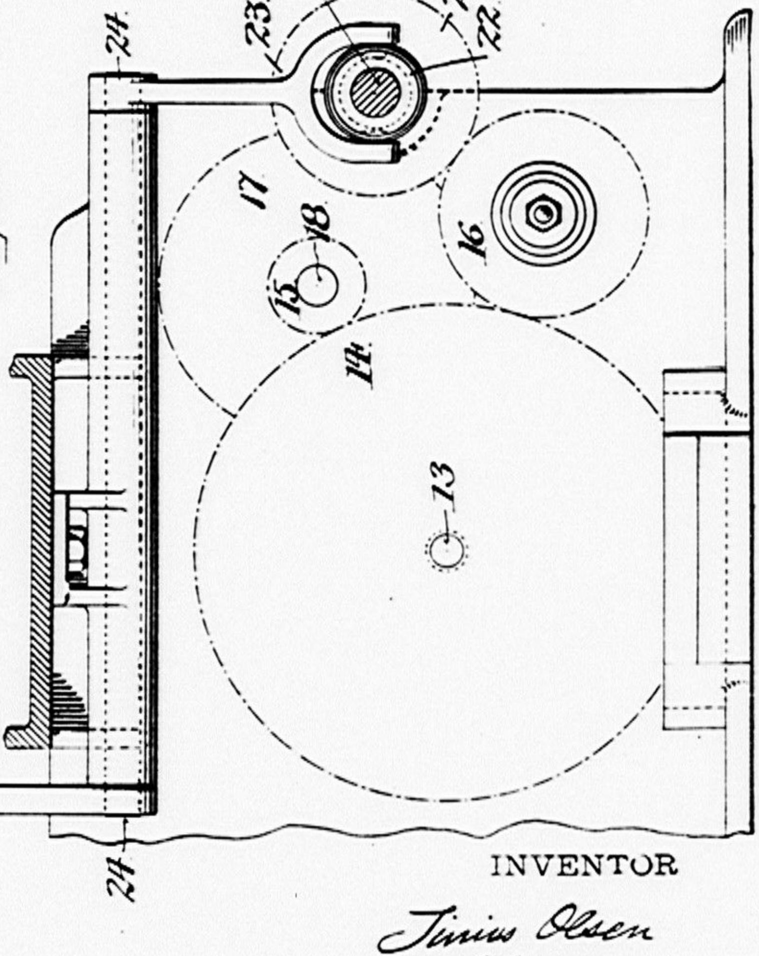

Fig. 14.

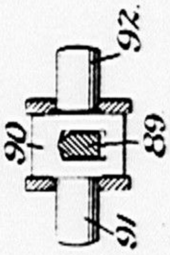

Fig. 23.

WITNESSES

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RECORDING TESTING MACHINE.

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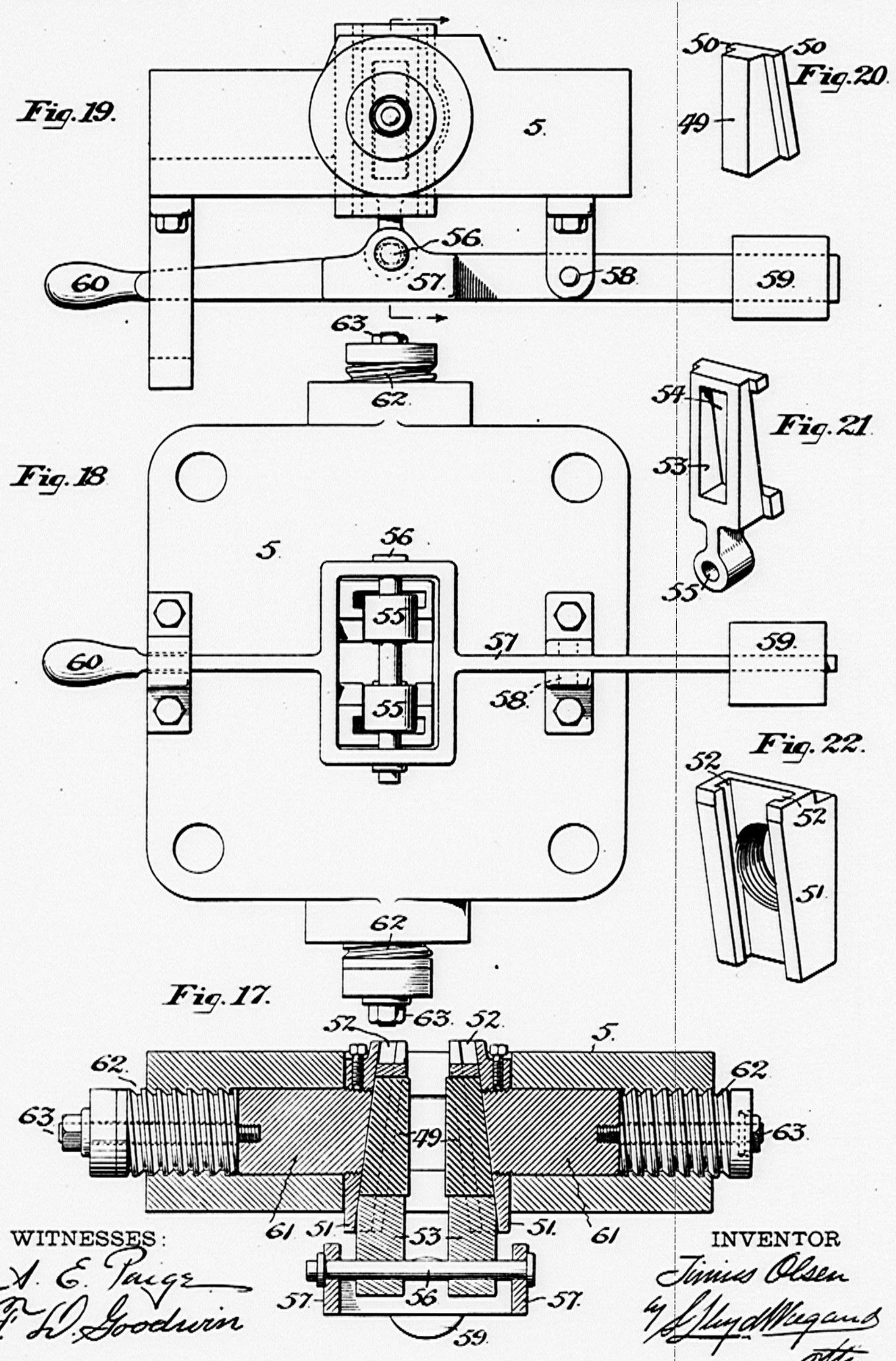

WITNESSES:

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(No Model.)

8 Sheets—Sheet 7.

T. OLSEN.

RECORDING TESTING MACHINE.

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Patented Jan. 27, 1891.

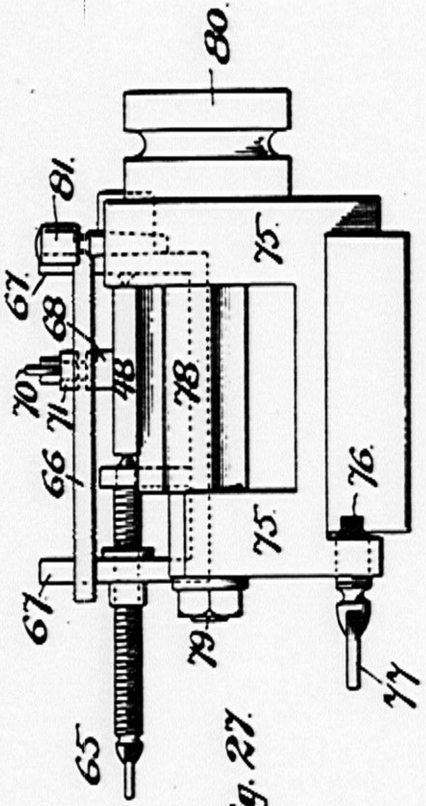
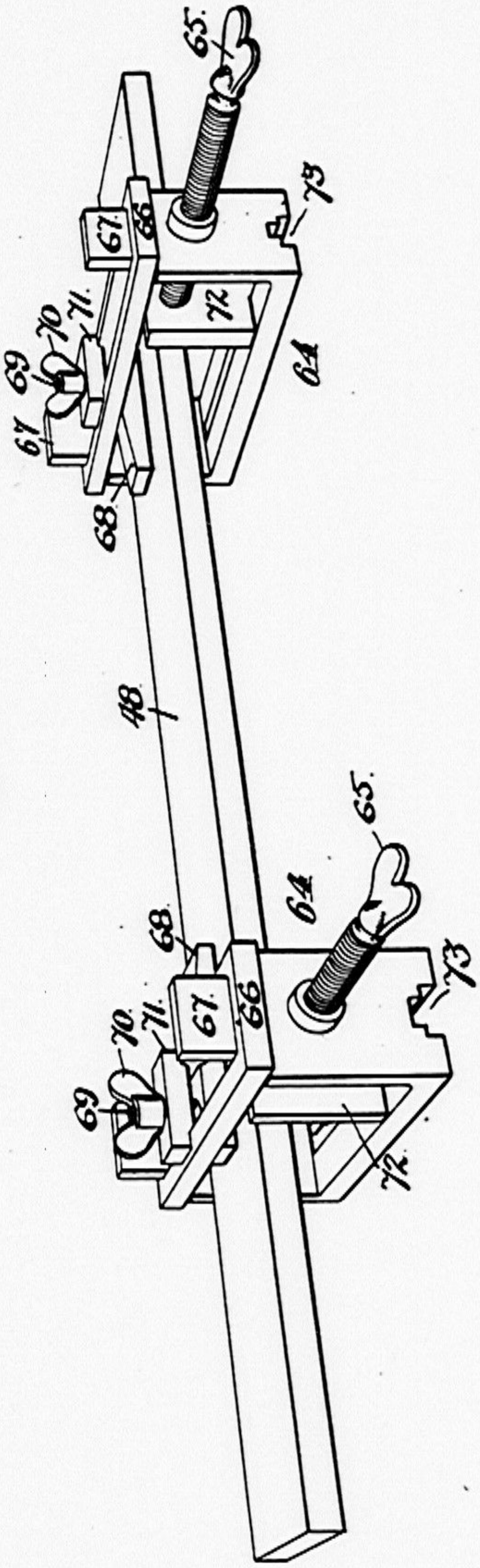


Fig. 27.

Fig. 24.



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T. OLSEN.

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Patented Jan. 27, 1891.

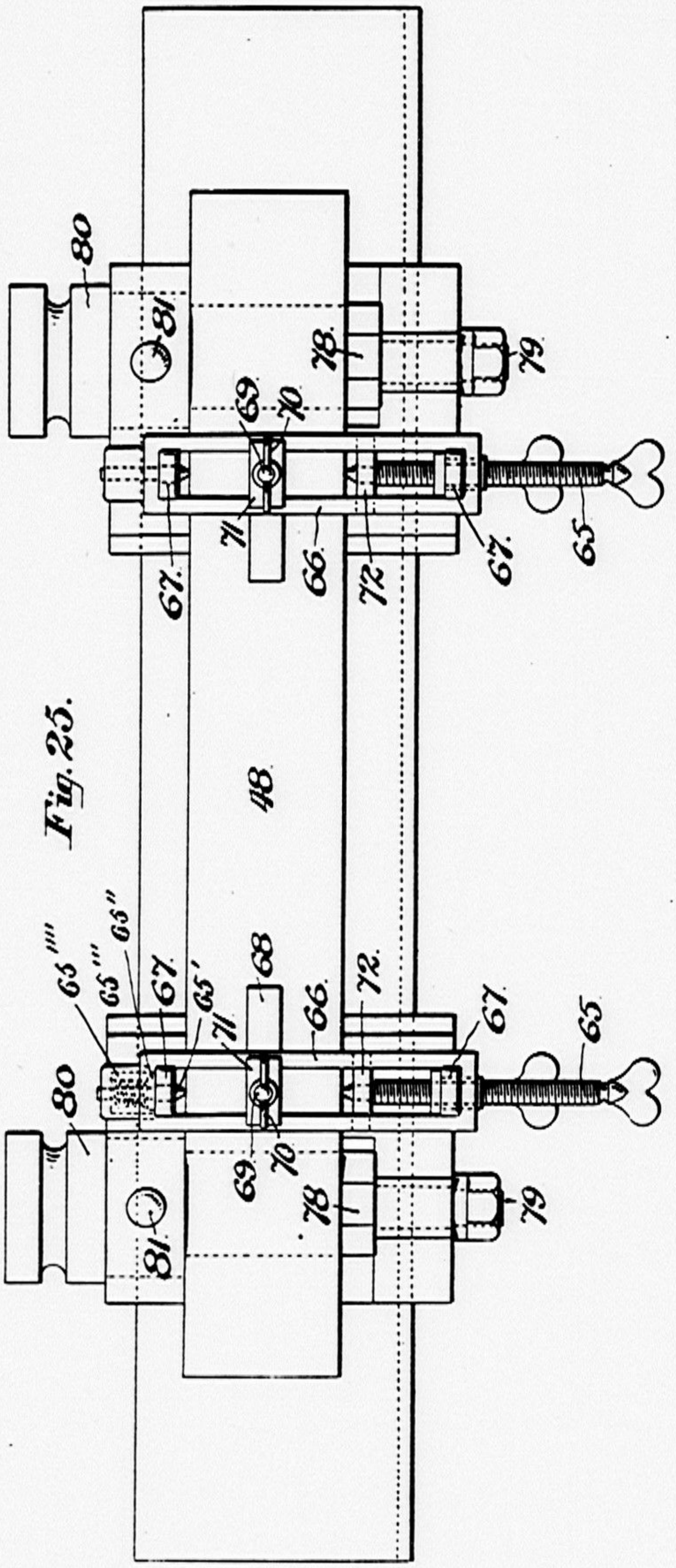
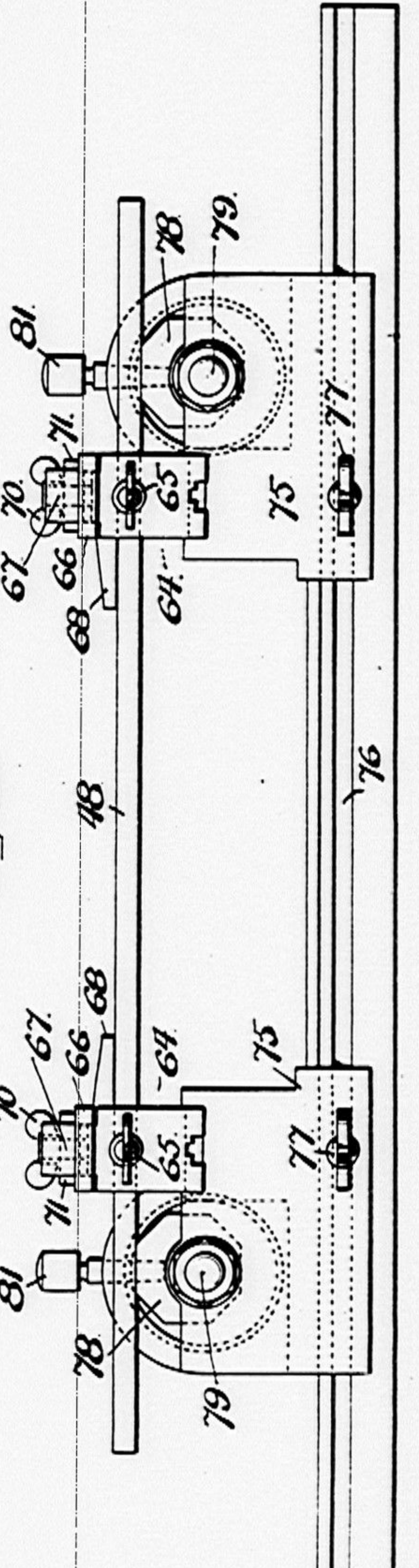


Fig. 25.

Fig. 26.



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UNITED STATES PATENT OFFICE.

TINIUS OLSEN, OF PHILADELPHIA, PENNSYLVANIA.

RECORDING TESTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 445,476, dated January 27, 1891.

Application filed May 23, 1890. Serial No. 352,827. (No model.)

To all whom it may concern:

Be it known that I, TINIUS OLSEN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Testing-Machines; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof to enable others skilled in the art to make and use the said invention.

This invention relates to certain improvements in the testing-machine for which Letters Patent of the United States, respectively dated June 1, 1880, and March 12, 1889, and numbered 228,214 and 399,549, were granted to me.

The objects of this present invention are a better and more quickly-applied gripping device for holding the specimens under test, greater and easier and more universally applicable facilities for transmitting the distortion of specimens under test to the measuring and recording apparatus, the avoidance of inaccuracies in previous machines consequent upon changes of form and dimensions during the testing operation, a greater celerity in working the machine, and a ready adaptability of the same machine to specimens of large and small dimensions and to material of greater and lesser tenacity; also, devices for attaching the measuring-instruments to specimens, for expediting work and regulating adjustably the rate of automatic weighing of the increased strain, and providing an automatic alarm for any accidental interruption of the working of the weighing mechanism. These several desiderata are accomplished by mechanisms hereinafter fully described, and illustrated in the accompanying drawings, in which—

Figure 1 shows a front elevation of a testing-machine embodying this invention; Fig. 2, a top or plan view thereof. Fig. 3 is an enlarged vertical section of a portion of the invention shown in Fig. 1 in the plane indicated by the dotted line *x x* in Fig. 1, showing the parts involved in the mechanism for transmitting motion from the calipering devices to the recording-cylinder. Fig. 4 is a detached front view of the weighing-beam, showing a modification adapted to testing of small and light specimens of the poise portion of the weighing-beam. Fig. 5 is another modification for the same purpose as Fig. 4. Fig. 6 shows an enlarged view of the balancing-pivot of the weighing-beam and the pulley for transmitting motion to the recording apparatus. Fig. 7 is a detached plan view of the calipering mechanism for measuring the extension of material under test. Figs. 8 and 9 are respectively a plan and a side view of the calipering parts drawn on an enlarged scale. Figs. 10 and 11 are respecttively elevations and detached views of the calipering devices for measuring extensions. Fig. 12 is a partial section of the parts involved in attachments of the calipering mechanism to the recording drum or cylinder. Fig. 13 is a section presenting the same in elevation and end view. Fig. 14 shows an outlined end elevation of the gearing for transmitting motion from the driving-power to the extending or stretching mechanism of the machine, showing the mechanism for changing from a slow movement with great force to a quicker motion with less force. Figs. 15 and 16 show rear views of the same in different positions of adjustment—to wit, for fast motion and for slow motion. Fig. 17 shows the mechanism for gripping specimens at the upper end. Fig. 18 is a plan view of the mechanism for gripping specimens. Fig. 19 is a vertical section of said mechanism. Figs. 20, 21, and 22 show in detached views the jaws and holders thereof for gripping specimens. Fig. 23 shows the fulcrum for equalizing the action of the two arms of the calipers shown in Figs. 7 and 8. Fig. 24 shows a perspective view of a device for clamping the specimens so as to apply the calipers for measuring the changes of form in the direction of the line of force. Fig. 25 shows an apparatus in plan view for expeditiously applying the clamping mechanism shown in Fig. 24. Fig. 26 shows a front elevation thereof, and Fig. 27 is an end view thereof. Fig. 28 is a detached view of the adjustable gearing for varying the rate of motion of the poise on the weighing-beam; Fig. 29, a section thereof, and Fig. 30 an enlarged detached view of the alarm apparatus for signaling interruptions of the weighing function.

The general construction of the frame-work of the machine and of the levers for multiplying the force from the weighing-beam and the screws for moving the testing-jaws is similar to that shown in the patents above referred to; but, for the purpose of facilitating a clear understanding of the novel parts, they are shown in the drawings and referred to by reference-marks in this specification.

1 is the entablature in which the upper jaws are fitted, which entablature 1 rests upon four columns (marked 2) resting upon a base 3, which rests upon the knife-edged pivots 4 of the force-multiplying levers 116 and 117. (See Fig. 1.) The levers 116 and 117 are supported by fulcrums 46, resting on the base 47.

5 is the lower moving head containing the lower gripping-jaws, and is moved downward and upward by four screws marked 6, operated by nuts 7, turned by gear-wheels 8 in the base of the machine 47. The gear-wheels in the base of the machine are propelled by one pinion 9, moving all of them at the same velocity, so that a uniform motion is imparted to the moving head at all parts, and the parallelism thereof with the upper head or entablature is preserved. The wheels 8 and nuts 7 are shown in dotted lines in Fig. 1. The central vertical pinion 9 is propelled by a beveled wheel 10, fixed upon the lower portion of its shaft 11 and turned by a beveled pinion 12 upon a horizontal shaft 13, provided at its outer end with and turned by a spur-wheel 14, which is driven alternately by a pinion 15 or an idle-wheel 16. The pinion 15 is secured to and turned by a spur-wheel 17 upon its arbor or stud 18, and driven by a pinion 19, fixed upon a sleeve 22, sliding upon and turning with the driving-shaft 20. The sleeve 22 has also fixed upon it a spur-wheel 21, and is susceptible of lengthwise motion on the shaft 20, so that when the said sleeve 22 is in one position, as shown in Fig. 15, the pinion 19 is brought into gear with the spur-wheel 17, which turns said wheel, and with multiplied force and decreased velocity, and turns the pinion 15, secured to the wheel 17. The pinion 15 engages in the teeth of the wheel 14 on the shaft 13 and turns them with increased force, attended with a further reduction of velocity. When said sleeve 22 is moved in the opposite direction, as shown in Fig. 16, the pinion 19 is disengaged from the wheel 17, as shown in Fig. 16, and the spur-wheel 21 engages in the wheel 16, which transmits the motion to the wheel 14 and shaft 13 with a much greater velocity but less multiplication of force than in the adjustment previously described, enabling the operator to adjust the position of the moving head to positions suitable to specimens of different lengths with greater celerity.

The lengthwise motion of wheels 19 and 21 and their connecting-sleeve 22 on shaft 20 is effected by collars formed on the sleeve 22 engaging a forked lever 23, fastened to and operated through a shaft 24 and hand-lever 25 on the opposite end of the shaft, at the front of the machine.

The rotative motion of the shaft 20 is derived from pulleys 26 and 27, which turn freely upon the said shaft 20, unless engaged therewith, which they can only do alternately by the friction-clutches 28 and 29, operated by a sleeve 30, controlled by a forked lever 31 through a shaft 32, operated by hand-lever 33 at the front of the machine. The motion which engages the clutch 28 must previously disengage the clutch 29, and when the lever 31 and sleeve 30 are in intermediate position neither is engaged. The pulley 26 is made large in diameter and of broad face, so as to convey ample power for the testing of the strongest specimens and is driven by a correspondingly strong band and driving-power wheel, while the pulley 27 is of smaller diameter and narrower face and is driven by a narrow band from a pulley having a face traveling at a higher velocity. By the use of these two pulleys great celerity of action is procured in adjusting the machine to the position where the power becomes operative on the specimens under test.

Upon the end of the shaft 20 is secured a grooved wheel 34 of large diameter, so as to turn with it. A very small wheel 35, turning with an arbor 36, imparts motion to the wheel 34 when pressed into the groove, which is done by means of a chain 37, adjusting-screw 38, and nut 39, shaped as a hand-wheel, raising the tilting bearing 40 in (which the arbor 35 turns) at one end and depressing the other end. The arbor 36 receives rotative motion from the band-wheel 41, connected by an endless band 42 with the pulley 43 of small diameter, secured to and turning with the pulley 27. A helical spring 44 is interposed between the nut 39 and the support 45, so that the degree of pressure exerted in engaging the wheel 35 into the wheel 34 can be easily and evenly distributed on the periphery of the wheel 34 by the frictional contact of the wheels, thus procuring a very slowly and evenly applied stress.

The specimen under test (marked 48 in the drawings) is held between gripping-jaws 49. (Shown in Figs. 17, 18, and 19, and separately with its accompanying parts or adjuncts in Figs. 20, 21, and 22.) The jaws 49 themselves are wedge-shaped, as shown in detached views in Fig. 20. The perpendicular side of the wedge is placed against the specimen, and the inclined side, which is provided with projecting flanges 50, fits in a correspondingly-inclined block-slide 51 in the grooves marked 52.

The jaws are supported during the operation of introducing the specimen by a slotted slide 53, fitting through an opening 54 formed in said slides, which slides 53 are provided with eyes 55 fitting on a bolt 56 in a lever 57, balanced upon a fulcrum 58 by a counter-weight 59. The lever 57 is provided with a handle 60 at the front of the machine, so that the operator can raise and lower the jaws and wedge them upon the specimen under test when the specimen is not under strain, which affords a great facility in the introduction of the specimen. The slides 51 are fitted upon plungers 61, fitted to slide horizontally in the entablature 1 and the moving head 5. The plungers 61 are forced inwardly and supported in position laterally by strong screws 62, fitted in nuts formed in the draw-head 5 and in the entablature 1. The plungers 61 are compelled to follow the return motion of the screw 62 by a screw-bolt 63, fitted centrally through the screw 62 into the plunger 61. By turning the screw 62 different lateral adjustments of the slides 52 and jaws 49 are readily effected to adapt the space between the jaws 49 to different thicknesses of specimens. When strain is applied in the direction of the length of the specimen, the jaws 49 slide toward the converging ends of the slides 52, and are forced more tightly against the specimen, increasing the grip thereon.

When the specimen is introduced, the jaws 49 are, by means of the lever-handle 60 and lever 57, bolt 56, and slide 53, drawn toward the converging ends of the slide 51 and opened. After the specimen is inserted, by a reverse movement of the handle 60 the jaws 49 are closed against the specimen, the jaws remaining, by reason of their balanced condition from the action of the counter-weight 59, in whatever adjustment they may have been placed by hand until the tensile strain is applied, when they are forcibly drawn toward the converging ends of the slides 52, and must firmly grasp the specimen.

Upon the specimen 48 are placed collars or clamps 64, fastened thereon in definite position by pointed set-screws 65, the purpose of which collars or clamps 64 is to measure the amount of the extension which takes place during the test in the length of the specimen between the points of impingement upon the specimen by the set-screws 65 in the two collars or clamps 64.

The construction of the collars or clamps 64 is shown in Figs. 25, 26, and 27, and in Fig. 23 in perspective on an enlarged scale.

The specimens 48 are secured in the clamps 64, between pointed screws 64′ and opposite points 65′, which opposite points 65′ are forced toward the specimen by a helical spring 65‴ in a cavity 65⁗, pressing against the collar 65″, so that the impingement of the points 65′ and the screw-point 65 is with an elastic pressure and reaction, and by such reaction adapts the clamps 64 to any changes of form, such as reduction in breadth or thickness of the specimen during the test.

For facility of applying and removing the specimens, the clamps 64 are made with a detachable cap or side piece or plate 66, fitting over tenons 67 and provided with guiding-plates 68, attached by screws 69, provided with nuts 70 and washers 71, fitting the top of the clamp 66, so that when the top of the clamp, with its guiding-plates, is placed firmly against the specimen and the points of the set-screws 65 entered the sides of the specimen 48 the clamps will, although attached to the specimen by two points only, by the assistance of the guiding-plates 68 retain the desired position on the specimen 48. Other specimens can be quickly brought into the same position without any pains or delay in readjustment by simply letting the caps or side plates 66 of the clamps 64 and the connected guiding-plates 68 rest on the specimen. The correct alignment of the screws 65 with the point 65′ on the opposite side of the specimen in the same clamp is secured by a guiding-block 72, through which the screw 65 passes and fits, said block 72 sliding between the base of the clamp 64 and the cap 66.

In order to apply the clamp easily and at the same time at definite distances upon specimens for any series of tests, an apparatus shown in Figs. 25, 26, and 27 is provided, upon which the base of each of the clamps 64 fits. The clamps 64 have grooves 73 in their under side, which fit upon corresponding ridges or tongues upon sliding blocks 75, which sliding blocks 75 are fitted to slide lengthwise upon a supporting-guide 76, and are held in lengthwise adjustment thereon by set-screws 77. The function of the sliding blocks 75 and guide 76 is to provide a prompt and easy means of locating the clamps 64 at the same definite distances upon the specimens to be tested, and also to afford a ready means of locating the specimens in the clamps 64 with proper relation to the points of impingement of the set-screws 65 to the thickness of the specimens. To effect this latter function in each of the sliding blocks 75, there is fitted, with the axis transverse to the slide 76, a polygonal prism 78, mounted eccentrically upon a shaft 79, and turned by the hand of the operator by knobs 80, and held in rotative adjustment by pins 81, fitting through the blocks 75 in holes in the journal of the eccentric polygonal prism 78. The position of the holes in the journals and the radial distance of the different sides of the prisms from their center of rotation are such that in the several adjustments thereof, when the pin interlocks with the holes in the journal and in the blocks 75, there will be a graduated height from the blocks and the sides of the prisms to furnish the support for different thicknesses of specimens, so as to hold them in position when the clamps 64 rest on the block.

In order that the set-screws 65 shall be in central position upon the edge or side in relation to the thickness of the specimens 48 in the event of having a number of specimens of the same thickness to test in a series, the operator having once adjusted the apparatus for such thickness can promptly apply the clamps to them with the set-screws 65 in the proper central position. Thus a series of tests can be made with very little detention in adjusting the specimens to the clamps.

When the specimen 48 is placed in the machine, it is held between the jaws 49 in the manner already explained and the calipers 82 and 83 (shown in Fig. 1, and in the enlarged view in Figs. 7 and 8) are placed in contact with the inner sides of the clamps 64. The calipers 82 and 83 consist of arms 84 and 85, pivotally attached by their ends opposite to those resting on the clamping device 64, the clamps 86 fitting upon upright bars 87 and 88. (Shown in Fig. 3.) A projecting arm 86′ extends from the clamps 86 between the arms 84 and 85 of the calipers 82 and 83, and has formed upon it a knife-edge 89, upon which fits a ring of metal 90, provided with an arm upon each side marked 91 and 92, which fit through apertures in the arms 84 and 85, and are curved so as to coincide with the motion in curved lines which the arms 84 and 85 have upon their pivots 93 and 94, by which they are attached to the arms 86′. The pivots 93 and 94, by which the arms 84 and 85 are attached to the arms 86′, are made susceptible of motion vertically as well as horizontally, so that the calipering-arms 84 and 85 can, with the ring 90 and arms 91 and 92, be vibrated upon a knife-edge 89. The calipering-arms 84 and 85 being applied with their end to the clamps 64, with one arm upon each side of the specimen, if any unequal extension of the specimen takes place upon one side more than the other the calipering-arms, turning upon a knife-edge 89, adapt themselves to such change and transmit the movement to the clamp 86, which movement is the mean between the motion of the two arms 84 and 85.

The motion of the calipers is transmitted through the arms 86′ and clamps 86 to the rod 87 and to the link 101. Motion of the rod 87 is transmitted by a lever 74 through the cord 95, (shown in Fig. 3,) passing round a pulley 96 in the end of the lever 97, mounted upon a fulcrum 98, and passes over a second pulley 99, up to a drum or winding-barrel 100. The winding-drum 100 is inclosed and supported in a hollow shell or case 102, which also in its lower part furnishes a support for the pulley or sheave 99. (Shown in Figs. 1, 3, 12, and 13.) The opposite arm of the lever 97 to that bearing the pulley 96 is connected pivotally by link 101 to the counter-arm of the upper caliper 83. This arm of the lever 97 is of such length relatively to the length of the arm bearing pulley 96, as well as to proportions of the arms of the calipering-lever 83, that the motion imparted to the drum 100 is the result of the differences of motion between the two calipers, the drum being always wound tight by a spring 100 (shown in the section in Fig. 13) and the position of the pulley 96 being varied by the position of the upper caliper 83. The rotation of the barrel 100 and the connected recording cylinder 102, fixed upon the same arbor and turning with it, is always proportioned to the variations of the distance between the calipering-points as controlled by the clamps 64, connected with each other by the specimen 48, to which they are attached.

The location of the lever 97 or link 101 and pulley 99 is in a vertical plane with a balancing-pivot 111 of the weighing-beam, making this transmission of motion to the cylinder 100, and is such as to be unaffected by the oscillation of the weighing-beam 118, to which the bearing of the arbor of the cylinder 100 and recording-drum 102 are attached, and a pencil 103, held in contact with the cylinder 102 or a diagram-sheet attached thereto, graphically records on said diagram-sheet the motions of rotation of the record-cylinder which may take place in consequence of any extension of stretching or other changes of shape of the specimen under test. The pencil 103 is attached to a nut 104′, fitting and moving lengthwise upon a screw 104, which is connected and turned with the screw 105, which shifts the weight 106 upon the weighing-beam 118. The shifting of said poise may be made by the operation of a cord and gearing controlled by electrical contacts and an electro-magnet, in the manner described in my earlier patents heretofore referred to. The combined effect of the lengthwise motion in the direction of the axis of the screw 104 as communicated to the pencil 103 and the motion of the diagram-sheet upon the cylinder 102 is to produce curved lines graphically indicative of the extension and also of the strain under which such extension took place, and thus affords an exact record of the properties of the material of the specimens under test and its strength at every stage of its tests.

In order to facilitate the introduction of the specimens, a cam 73, provided with a handle 73′, by which it can be turned upon its axle with its larger side either upward or downward, is placed under the lever 74. When turned with its larger side up, the lever 74 is raised and the caliper fingers or arms 84 and 85 are retracted from the collars or clamps 64 on the specimen, and when turned in the opposite direction the fingers or arms 84 and 85 rest upon the collars or clamps 64 and participate in their motion with the effect hereinafter described.

As above described, the invention is applied to the recording of tensile distortion of specimens, the same apparatus, however, being equally adapted for recording compression or any other distortion of a specimen in the line of stress it is subjected to.

It is not essential that the recording apparatus be mounted on the beam of the machine.

The calipers and connected levers and rods in connection with the lever 97, pulley 96, and cord 95 may be connected to a recording apparatus independent of the beam, the motion of the poise on the beam or the amount of stress in this case being transferred from the with the plungers 61 and screws 62 and 63, as and for the purpose set forth.

5. The clamp 64, having screws 65, adapted to impinge upon specimens and provided with tenons 67, in combination with the removable cap-plate 66 for facilitating the introduction of specimens and bracing the clamps against the thrust of the screw 65, substantially as set forth.

6. The guide-plate 68 and clamp 64, having the side plate 66 and screws 65, in combination with the screws 69, nuts 70, and washer 71, constructed and arranged substantially as and for the purpose set forth.

7. The clamp 64, having screws 65, in combination with the guiding-block 72, screw 69, nuts 70, side plate 66, and tenons 67, as and for the purpose set forth.

8. The slide 76, the clamps 64, and blocks 75, fitted adjustably as to distance on the said slide 76 and provided with seats adapted to fit the clamp 64, in combination with the eccentrically-journaled prism 78, angularly adjustable in bearings in the blocks 75, and a mechanism to hold said prisms in angular adjustment for the purpose of facilitating the central application of the clamp upon series of specimens at uniform distances for testing, substantially as set forth.

9. The curved lever-arms 91 and 92, the intermediate knife-edge fulcrum 89, the arm 86′, and the bars 87 and 88, in combination with clamps 86, fitted thereon, having caliper-arms 84 and 85, pivotally attached thereto and balanced upon curved lever-arms 91 and 92, resting upon an intermediate fulcrum 89, supported by the clamp 86, substantially as and for the purpose set forth.

10. In a testing and automatic recording-machine, the combination of the cylinder 102, the clamps 64, the calipers 82 and 83, and connected lever 97, proportioned and arranged as described, for limiting the transmitted motion to the difference of the motion of the calipers as controlled by the clamps 64 on the specimen, substantially as set forth.

11. In a testing-machine, the pulley 99 in vertical plane with the axis of the balancing-pivot, in combination with the drum or winding-barrel 100 and cord 95, connected with and operated by the calipers 82 and 83, substantially as and for the purpose set forth.

12. In a testing-machine, the combination of the caliper 82, sliding bar 87, lever 88, cord 95, pulley 96, pulley 99, drum or winding-barrel 100, lever 97, link 101, lever 88, and calipers 83 for measuring and transmitting the motion proportioned to the changes of space between the two calipers to the recording-cylinder, substantially as set forth.

13. In combination, the beam 118, provided with the pivotally-suspended poise 107, the poise 106, and poise-carriage 108, bearing a pivotally-suspended poise 109, constructed and arranged substantially as and for the purpose set forth.

14. In a testing-machine having a poise automatically moved on the beam, the combination of the friction-wheels 120 and 132 with the adjustable wheels 121 and 122, and a connected power-transmitting gear to vary the rate of motion of the poise, substantially as set forth.

15. The balls 123 and 124, the balls 125, the lever-arms 127, and the convex-faced wheels 121 and 122, supported by said balls 123 and 124, resting and turning upon said smaller balls 125, combined therewith and arranged to roll in grooves 126 in the lever-arms 127, substantially as set forth and shown.

16. In a testing-machine, the electrodes 134 and 135 and a connected alarm-circuit, in combination with the beam 118, arranged to operate with the abnormally-longer oscillations of the beam 118 and to remain inoperative with the normal oscillations thereof, substantially as set forth and shown.

17. The diagram-sheet-holding cylinder 102, the cord 95, and the pulley 99, in combination with the beam 118, constructed and arranged to oscillate and balance upon the fulcrum 111 and to support said sheet-holding diagram-cylinder 102, the calipers 82 and 83, arranged to rest upon and move with the specimen under test, the lever 97, connected therewith and with the said cord 95, guided by the pulley 99, located in the same vertical and horizontal planes as the fulcrum 111 of the beam 118 for the purpose of transmitting motion from the calipers to the diagram-sheet-holding cylinder without affecting the equilibrium of the beam, substantially as set forth.

18. In an automatic testing-machine, the cord 95, the clamps 64, the calipers 82 and 83, arranged to rest upon said clamps and participate therewith in the motions of two portions of the specimen under test, in combination with the lever 97, having a fulcrum 98 and a point upon each side of said fulcrum connected with one of the calipers for the purpose of transmitting indications of differences between the motions of two calipers through said cord 95 and eliminating the coincident motion of both calipers from such indication, substantially as set forth.

19. In an automatic combined testing and recording machine, the weighing mechanisms, the diagram-holding cylinder, the calipers 82 and 83, adapted to rest upon and participate in the motions of two portions of the specimen under test, and the lever 97, connected at points located upon opposite sides of its fulcrum with each of said calipers, in combination with the cord 95, operated by the lever 97 and connected with said diagram-holding cylinder, and a pencil moved and guided in parallel direction with the axis thereof by a mechanism connected to said weighing mechanism for the purpose of graphically recording combined indications of stress and motion between the parts of the specimen, substantially as set forth.

20. In a combined testing and automatic indicating and recording machine, the combi-

beam to the recording apparatus in the same manner by a cord over a pulley in vertical plane to the balancing-pivot or by any eqivalent means.

In order to adapt this machine and its system of measuring and recording devices to ready applicability to large and small specimens, it is desirable and sometimes necessary to use a lighter weight or poise than the usual weight 106, (shown in Fig. 1,) and in making such change of weight it becomes necessary to avoid any change in the position of the center of gravity in a vertical direction of the beam 118 and its rigidly-connected parts. If a smaller weight or poise is substituted for the large weight 106, and an additional weight 107, rigidly secured to the end of the beam 118, and located below the level of the beam 118 may be employed, or a weight hung pivotally from knife-edges 110, carried upon a traveling slide or trolley 108 upon the beam 118, so as to preserve the proper level position of the beam when in equilibrium throughout all adjustments of the weights 106 and 108, sliding upon it.

The rigid connection of the weight or counterpoise 107 to the end of the beam is preferable, because it imparts a steadier motion to the beam 118 when in operation.

To enable the poise 106 or 108 to be moved a greater or less distance for each oscillation of the beam 118, there is introduced in the mechanism for propelling the screw 105 a series of adjustable friction-wheels. (Shown in Figs. 28 and 29.) Motion is imparted by an endless band 140, propelled by the grooved pulley 141, and passing over guiding-pulleys 142 to the grooved wheel 133 turns with it a flat disk wheel 132, having a thickened rim. The rim of the wheel 132 is pressed between two wheels 121 and 122, having slightly convex or spherical faces centrally supported and turning upon balls 123 and 124, which rest upon smaller balls 125, rolling in circular grooves 126 in the opposite faces of bracket-arms 127, vibrated upon a fulcrum 128 by a lever 129, operated by a screw 130 and nut 131, controlled by the hand of the operator.

Between the wheels 121 and 122, opposite to the wheel 132, is placed a wheel 120, similar in form to the wheel 132, which has connected with it so as to turn therewith a wheel 132′, which operates an endless band 144, passing over guiding-pulleys 145, transmitting motion to the grooved wheel 146, turning the screw 105, which moves the poise 106 upon the beam 118 in the same manner as in the machines described in the patents hereinbefore referred to. When the central part of the wheels 121 and 122 embrace the rim of the wheel 120, the outer portion of the wheels 121 and 122 embrace the rim of the wheel 132, and the rotation of the wheel 132 is greatly retarded. By changing the position of the wheels 121 and 122 by means of the nut 131, screw 130, lever 129 vibrating the bracket-arms 127, an accelerating effect is produced, and by any intermediate adjustment any desired intermediate rate of motion is secured, thus adapting the rate of increased poise effect to suit the properties of the specimens under test. Such adjustments of the rate of increase of strain are readily effected during the progress of the test without interfering in any manner with the accuracy of the record.

The engagement of the mechanism for moving the weights 106 and 108 upon the beam is controlled by the operation of an electric circuit having in it one electrode 136, placed above and near the end of the beam 118, and another electrode 137, attached to the beam 118 and directly under the electrode 137. These electrodes close the circuit when the strength of the specimen under test exceeds the force of the weights as adjusted on the beam, and the closing of the electric circuit actuates the screw 105, in the manner described in my former Letters Patent hereinbefore referred to.

In order to relieve the operator from the necessity of constantly watching the motion of the beam 118 and connected parts throughout the test, and to indicate to the operator when the machine is moving too fast or the poise is shifting too slowly, and from either of these causes the beam rises to the upper limit of the locking-frame and the machine demands attention, under such conditions I connect with the electrical-contact apparatus an alarm by means of a second pair of electrodes 134 and 135—shown in Fig. 30, where they are shown as attached to the upper end of the electrode 136, which, by contact with the electrode 137 in the beam 118, controls the motion of the screw 105, moving the poise 106 in the manner described in the earlier patents.

The electrodes 134 and 135 make contact only when the beam 118 rises beyond its normal range of vibration, and then an alarm operated by the electric circuit in control of the electrodes 134 and 135 signals for the attention of the operator.

Having described my invention and the operation thereof, what I claim is—

1. In a testing-machine, the compound gearing having an additional idle-wheel 16, in combination with the train of gearing consisting of the wheel 14, pinion 15, wheel 17, pinion 19, and wheel 21, arranged to transmit motion alternatively, as and for the purpose set forth.

2. In the heads of a testing-machine for holding specimens, the gripping-jaws 49, in combination with the blocks 51, slide 53, bolt 56, lever 57, and counter-weight 59, as and for the purpose set forth.

3. The head 5, blocks 51, jaws 49, and plungers 61, fitted through the said blocks 51 and arranged to bear directly on the inclined surface of the jaws 49, in combination with the screws 62, fitted in nuts formed in the head 5 and arranged to operate substantially as set forth.

4. The head 5 and jaws 49, in combination

nation of the poise or weight 106, beam 118, diagram-holding cylinder 102, the lever 97, and the calipers 82 and 83, adapted to rest upon and participate in the motions of two portions of the specimen under test and connected with said diagram-holding cylinder by the said lever 97 for eliminating the motion of the entire specimen and transmitting only the differences of motion between the calipers with the recording-cylinder, and a pencil connected with the poise or weight 106 on the weighing-beam 118, combined with and controlled by the contact of electrodes operated by the oscillations of the beam 118, substantially as set forth.

TINIUS OLSEN.

Witnesses:
WALTER J. BUDD,
J. DANIEL EBY.

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MECHANICAL TESTING

A TREATISE IN TWO VOLUMES

BY

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VOLUME I.
TESTING OF MATERIALS OF CONSTRUCTION

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that errors are introduced into the results owing to the variability of the friction caused by the ram packing. This objection has now been overcome, in the machine constructed by Messrs. Alfred J. Amsler & Co., by using oil as the fluid together with an accurately fitted ram and cylinder with small clearance, thus eliminating the packing friction.

Amsler Testing Machine.—A 50-ton universal machine of this make is shown in Fig. 54. Each installation consists of three main parts:—

(1) The press or actual testing machine (P).
(2) The oil pump for producing the pressure (O).
(3) The pendulum dynamometer for measuring the load from the oil pressure in the pressure cylinder (D).

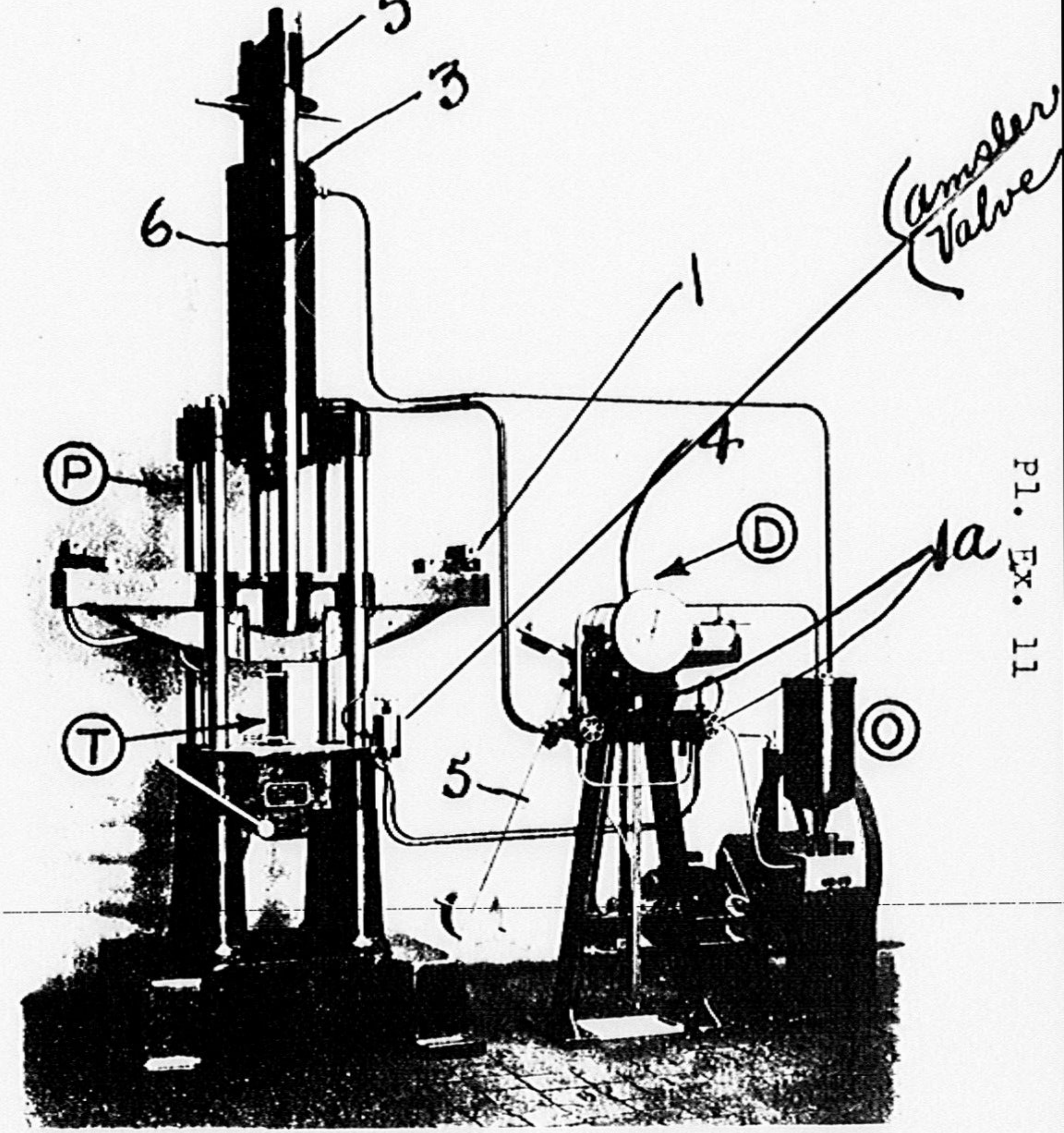
The Press.—The press is fixed to the top part of the machine, and the movable cradle carrying the upper grips is freely suspended from the ram by two rods connected by a cross-head which rests on the top of the ram. The bottom of the cylinder of the press is held rigidly to the base of the machine by four round columns, which are made heavy enough to carry the superstructure and to carry the maximum load without deformation.

The base itself does not take any of the load applied to the test-bar (T), it is required merely as a support for the machine and to raise the working parts to a convenient height above the floor level. It is made in the form of a hollow iron casting with an opening in the front for the recovery of the fractured test-pieces.

The ram of the press is fitted in the cylinder with such precision that no collar or cup leather is required to ensure a sufficiently oil-tight working. The small amount of play which the ram has in the cylinder allows a slight infiltration of oil to take place between them, this makes the movement of the ram in the cylinder very easy, eliminating friction and allowing an exact measurement of the total stress to be made. The ram can be rotated by a handle so that by occasionally moving it through a small angle the formation of ridges, etc., is avoided.

Oil Pump.—The press is operated by oil pressure produced by a high pressure pump driven by an electric motor from a countershaft (for small machines a hand drive can be employed). The arrangement of suction and delivery of the oil is such that if all the valves are kept closed the oil is automatically short circuited back to the reservoir which is carried on the pump stand. There are also returns for the oil to the reservoir from the top of the cylinder due to leakage, and for the released oil from under the ram.

Water pressure may be used to work the machine by making



Pl. Ex. 11

FIG. 54.—Amsler's 50-ton universal testing machine.

[*To face p.* 68.

arrangements for transforming into oil pressure for working the press.

The Dynamometer Apparatus.—The measurement of the load is made by means of a pendulum dynamometer. The oil from the high pressure pump is admitted to the straining cylinder through the dynamometer, so that the actual pressure in the cylinder is shown by the pointer which is operated by the dynamometer.

The pendulum dynamometer is a modification of the dead weight gauge which is used for calibrating pressure gauges, the pendulum arrangement being used to automatically balance the load on the plunger, as shown in Figs. 55 and 56. The oil pressure is applied to a plunger (P), which is kept slowly revolving during the test by the pulley P_y, from which it is transmitted to a yoke (Y) connecting two vertical rods G_1 and G_2. The tops of these rods are attached through a ball-bearing coupling to a short block lever (H), which is rigidly secured to a shaft (J) mounted in ball-bearings in the manometer frame. The depression of the block (H) by the pressure causes the heavy pendulum (B) to be deflected until it assumes a position of equilibrium. The point of suspension of the pendulum (C) can be altered so as to increase the sensitiveness of the machine, the connection to the recording gauge being adjusted at the same time.

The pendulum operates a pointer on a dial by means of an arm and rod (A). An autographic recording apparatus (R) is also provided.

As a rule each testing machine is accompanied by a pump and separate dynamometer, but it is possible for several machines to use a single pump, if worked in conjunction with an air accumulator, and a separate dynamometer for each machine.

§ 42. **Torsion Testing Machines.**—Many universal testing machines of the lever type are fitted with a special shackle for applying torsional load as illustrated diagrammatically in Fig. 57, in which the torque is applied by a worm and worm-wheel A and measured by running the jockey weight B along the lever arm C. It is, however, usually more convenient to have a separate machine for the test.

(i) **Avery Torsion Machines.**—Fig. 58 shows a machine of 150,000 lbs.-ins. capacity embodying the method of test mentioned above.

This machine will apply torsion tests to unprepared bars, up to a maximum of 3 inches in diameter, and 6 feet in length. The twisting strain is effected through the medium of an electric

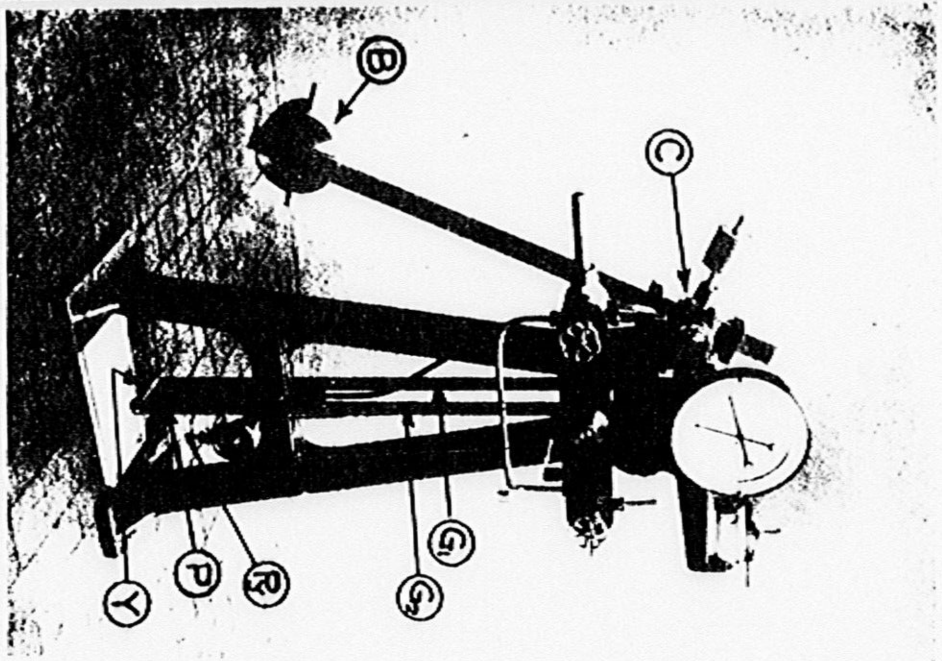


Fig. 55.—Pendulum dynamometer for Amsler testing machine (front view).

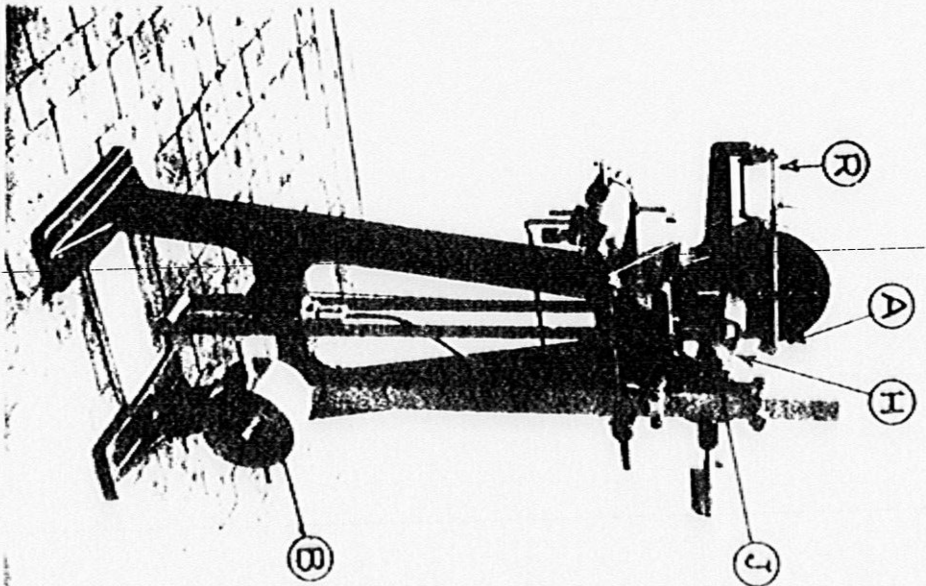


Fig. 56.—Pendulum dynamometer for Amsler testing machine (back view).

[To face p. 69.

381-382

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Sept. 11, 1923. **1,467,522**

A. AMSLER

PRESSURE CONTROL VALVE

Filed March 31, 1921

Fig. 1

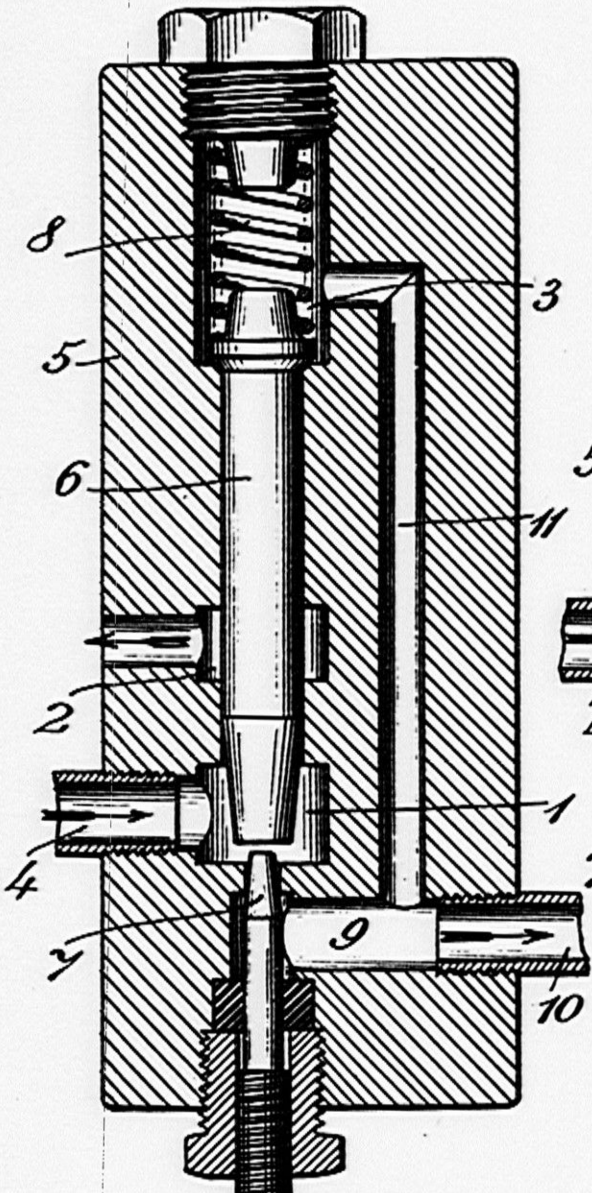
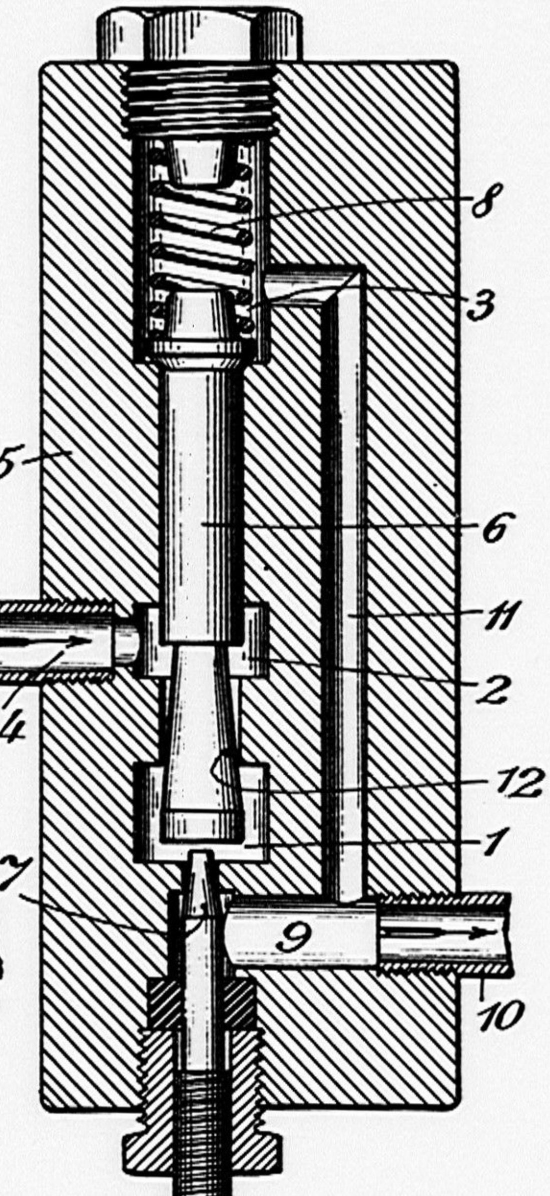


Fig. 2



Inventor:

Alfred Amsler,

By

Atty.

Patented Sept. 11, 1923. **1,467,522**

UNITED STATES PATENT OFFICE.

ALFRED AMSLER, OF RHEINBUHL, SWITZERLAND.

PRESSURE-CONTROL VALVE.

Application filed March 31, 1921. Serial No. 457,480.

To all whom it may concern:

Be it known that I, Alfred Amsler, a citizen of the Republic of Switzerland, residing at Rheinbuhl, Schaffhausen, Switzerland, have invented certain new and useful Improvements in a Pressure-Control Valve; and I do hereby declare the following to be a clear, full, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in a device for automatically maintaining a constant pressure difference, i. e., a constant surplus pressure or over-pressure between two points of a pressure conduit.

A device of this type interposed for instance in the high pressure conduit leading to a hydraulic press serves to transmit liquid to said press at a uniform over pressure, which is regulatable at will within wide limits, whatever be the back pressure and the variations of back pressure in said press. In consequence of the uniformity of this over-pressure, the piston of the press moves always at the same speed. Thereby it is assumed that the given liquid pressure is greater than that required in the press. In the device according to the invention and inserted in the high pressure conduit leading to a press, the liquid under pressure is led into one of two intercommunicating chambers, an easily movable piston with a conical end being provided that automatically decreases the passage of the liquid to the press cylinder sufficiently to maintain a constant difference between the incoming pressure and the back pressure when the pressure acting on the front end of said piston is greater than the back pressure acting behind the piston, said back pressure being equal to the pressure existing in the press cylinder plus a pressure exerted by a spring.

In a regularly acting pump there is always a certain quantity of liquid disposable per second, whose pressure depends on the back pressure to overcome.

In a pressure accumulator the quantity of liquid disposable is so to say unlimited, whereas the pressure remains approximately constant.

For this reason the over-pressure regulator is executed in two forms which differ slightly from each other, one of these forms being intended for use with a hydraulic press receiving the liquid under pressure directly from a pump, and the other for use with a hydraulic press receiving the liquid from a pressure accumulator.

An adjustable valve is advantageously provided in the exit passage of the front chamber in order to allow of the speed of the liquid being regulated.

The accompanying drawing shows an example of each of the two above mentioned forms.

Fig. 1 is a longitudinal section of the first, and Fig. 2 a longitudinal section of the second form.

The over-pressure regulator illustrated in Fig. 1 is intended for use with a pump. The liquid under pressure passes from the pump, through conduit 4 into the front chamber 1 of cylinder 5. When the exit passage of chamber 1 is completely closed by means of point 7, the pressure rises therein and repels the piston 6 against the action of spring 8 until the liquid escapes into the middle chamber 2 and runs off.

As soon as the outlet of chamber 1 is opened by screwing back point 7, the liquid contained in chamber 1 passes out into chamber 9 and from there through conduit 10 into the cylinder of the hydraulic press. Chamber 9 is connected to chamber 3 containing spring 8, by means of conduit 11, the pressure behind the piston in chamber 3 is therefore the same as in chamber 9. The liquid pressure in chamber 3 together with the pressure exerted by the spring 8 tend to push the piston 6 forward and thus to prevent the liquid from running off into the middle chamber 2. On the front side of piston 6 there only acts the liquid pressure existing in chamber 1.

When the piston 6 is equally balanced the pressures existing on either side thereof are equal to each other and to that of the pressure existing in chamber 3 plus that exerted by the spring, the pressure existing in chamber 9 being equal to that in chamber 3.

The difference between the pressures existing in chambers 1 and 9 is therefore constantly equal to that exerted by spring 8.

When the pressure in chamber 1 acting on the piston becomes slightly greater than the back pressure behind said piston, the latter moves backwards until the superfluous liquid can run off into chamber 2, so as to reestablish the balance between the pressures acting on either side of the piston. The liquid passes therefore from chamber 1 to chamber 9 and conduit 10 at constant pressure, whatever be the back pressure existing in chamber 9 and in the cylinder of the hydraulic press.

The quantity of liquid which passes through, depends on the size of the opening left free by the valve point 7, it increases the more said valve point is screwed out, that is to say the larger the opening.

If during a trial, the position of the valve point 7 is left unaltered, an equal quantity of liquid will always pass from chamber 1 to chamber 9.

The over pressure regulator shown in Fig. 2 is intended for use in connection with a pressure accumulator.

The liquid under pressure passes from the said accumulator through the conduit 4 into the middle chamber 2 of cylinder 5.

When the piston 6 is pushed forward, that is to say towards the chamber 1, the liquid is able to pass into the forward chamber 1 along the conical part 12 of piston 6.

This second form is otherwise similar in construction to that shown in Fig. 1.

When the valve point 7 shuts off the chamber 1, as shown in the drawing, the liquid coming from the chamber 1 cannot pass, the pressure is therefore equal to that existing in chamber 2.

Piston 6 is pressed backwards against the action of spring 8, the cone 12 thereupon shutting off the communication between chambers 1 and 2.

Should the outlet of chamber 1 be slightly opened by unscrewing point 7, the liquid may pass from 1 into chamber 9 and from here through conduit 10 into the cylinder of the hydraulic press.

When the valve is open and balanced the difference of pressure between chambers 1 and 9 is equal to the pressure exerted by spring 8.

If the pressure exerted on the piston in chamber 1 becomes greater than the back pressure behind the piston 6, the latter returns and closes the passage between 2 and 1 sufficiently so that only the amount of liquid is allowed to pass which is required to reestablish the equilibrium of the piston. The liquid flows from 1 to 10 under constant pressure, whatever be the back pressure existing in chamber 9 and in the cylinder of the press.

The over pressure regulator according to the present invention is advantageously used in connection with all presses worked by the pressure of liquids where it is important that the piston rises at a constant speed whatever be the resistance to overcome said speed being adjustable at will during the operation of the press. Machines of this kind are utilised to operate testing machinery or to press dough-like substance into bands, strings or tubes, for instance gunpowder presses, pencil presses, lead wire or tube presses, macaroni presses and the like.

It is only necessary, in order to be able to mount the over pressure regulator in the high pressure conduit leading to the press that the available pressure be greater than that required in the press or to surmount the pressure exerted by the spring in the regulators, it is not necessary that the pump work regularly or evenly or that the pressure in the accumulator be constant. The fact that the piston establishes the connection between chambers 1 and 2 in such a manner that the liquid passes at constant pressure from 1 to 2 prevents a shock in the conduit 4 from producing a shock in the conduit 10.

A hydraulic press fitted with an overpressure regulator will therefore act as regards uniformity of working in the same manner as a mechanically operated screw press working at a uniform speed, the advantage being that the former is rapidly adjustable during operation, easily develops great power, works fast with but a small consumption and has a high efficiency.

I claim:

1. In a device for automatically maintaining a constant pressure difference between two points of a pressure fluid conduit, in combination, two chambers, one of which is connected to the incoming pressure conduit, a connection between the two chambers and a connection between one of said chambers and the outgoing conduit, a floating piston having equal effective areas at both ends when fluid is passing through said device and adapted to automatically control said connection between said two chambers, the incoming fluid pressure tending to move said piston in one direction and the back pressure existing in the outgoing conduit increased by an additional pressure tending to move said piston in the other direction, the control being so effected that the pressure existing in the chamber connected to the outgoing pressure conduit is always higher than the back pressure in the outgoing conduit by the amount of said additional pressure applied to the controlling piston, whatever be the absolute pressures and the variation thereof.

2. In a device for automatically maintaining a constant pressure difference between two points of a pressure fluid conduit, in combination, two chambers, one of which is connected to the incoming pressure conduit, a cylindrical bore connecting said two chambers and a connection between one of the

chambers and the outgoing conduit, a floating piston having, when fluid is passing through said device, equal effective working sections at both ends corresponding to said cylinder bore and provided with a tapering portion adapted to move in said bore, the incoming pressure tending to move said piston in one direction and the back pressure existing in the outgoing conduit increased by a spring pressure tending to move said piston in the other direction, the control being so effected that the pressure existing in the chamber connected to the outgoing pressure conduit is always higher than the back pressure in the outgoing conduit by the amount of said spring pressure applied to the controlling piston whatever be the back pressure and the variations thereof.

3. In a device for automatically maintaining a constant pressure difference between two points of a pressure fluid conduit, in combination, a chamber connected to the incoming pressure conduit and to the outgoing conduit, a second chamber provided with a free discharge opening, a cylindrical bore connecting said two chambers, a floating piston provided with a tapering end adapted to control the flow through said bore and ending within the first mentioned chamber so that the pressure of the incoming conduit acts on this end of said piston, a connection from the outgoing conduit to the other end of said piston so that the back pressure acts on the other end of the piston, a compression spring adapted to act on the other end of said piston so that the conical end of said piston adjusts itself automatically in such a position within said bore that the pressure inside the first mentioned chamber connected to the outgoing conduit corresponds always to the back pressure increased by said spring pressure and a constant pressure difference equal to said pressure of the spring is maintained between said first mentioned chamber and the outgoing conduit, whatever be the back pressure and the alterations thereof.

4. In a device for automatically maintaining a constant pressure difference between two points of a pressure fluid conduit, in combination, two chambers one of which is connected to the incoming pressure conduit, a cylindrical bore connecting said two chambers and a connection between one of said chambers and the outgoing conduit, a floating piston provided with a tapering portion adapted to move in said bore and arranged so that the incoming fluid pressure tends to move said piston in one direction and the back pressure existing in the outgoing conduit increased by a spring pressure tends to move said piston in the other direction, the controlling being thus so effected that the pressure existing in the chamber connected to the outgoing pressure conduit is always higher than the back pressure in the outgoing conduit by the amount of said spring pressure applied to the controlling piston whatever be the back pressure and the variations thereof, and means for regulating at any instant the quantity of fluid passing through the said connection between one of the chambers and the outgoing conduit.

5. In a device for automatically maintaining a constant pressure difference between two points of a pressure fluid conduit, in combination, two chambers, one of which is connected to the incoming pressure conduit, a cylindrical bore connecting said two chambers and a connection between one of said chambers and the outgoing conduit, a floating piston provided with a tapering portion adapted to move in said bore and arranged so that the incoming fluid pressure tends to move said piston in one direction and the back pressure existing in the outgoing conduit increased by a spring pressure tends to move said piston in the other direction, the controlling being thus so effected that the pressure existing in the chamber connected to the outgoing pressure conduit is always higher than the back pressure in the outgoing conduit by the amount of said spring pressure applied to the controlling piston whatever be the back pressure and the variations thereof, and an adjustable valve for regulating at any instant the quantity of fluid passing through the said connection between one of the chambers and the outgoing conduit.

In testimony that I claim the foregoing as my invention, I have signed my name

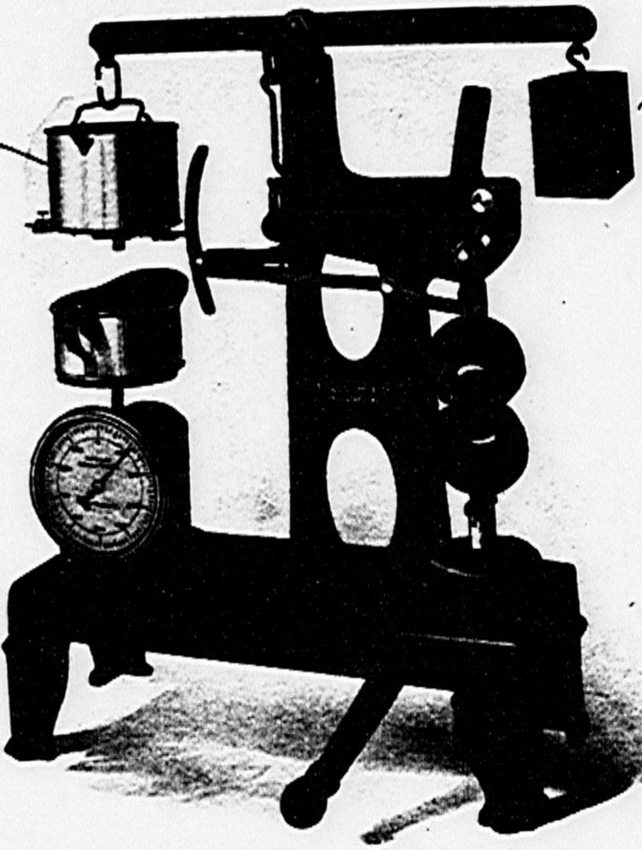
ALFRED AMSLER.

Pl. Ex. 13

Olsen New Automatic Shot Cement Testing Machine No. 1

Patented July 7, 1903

1,000 lbs. (500 kg.) and 2,000 lbs. (1,000 kg.) Capacity



A few of the users of this machine are listed on following page

Dimensions and Weight

1,000 lbs. (500 kg.) capacity. Length, 24 in. Breadth, 10 in. Height, 30 in. Weight, 155 lbs.

2,000 lbs. (1,000 kg.) capacity. Length, 40 in. Breadth 11 in. Height, 36 in. Weight, 170 lbs.

Plate No. 63

This illustration is of the very latest improved type of New Automatic Shot Cement Tester, and is the most up-to-date cement tester made.

To operate the machine, first place sufficient shot in the bucket to balance the lever system, as indicated by the pointer, then place the briquette in position in the clips, taking up the initial load, which may be set at a predetermined point by means of the hand wheel at the base. This forces the bucket end of lever down and gives sufficient lever motion so that when automatic trip is set and the shot is released from the bucket the machine need not be further regulated and thus automatically breaks the briquette.

The trip is set after applying initial load by pressing arc lever until it engages in cut off lever over the upper clip. The shot s released and flow of shot regulated by means of the slide valve and regulator at the base of the bucket. The flow of shot is nstantaneously stopped on rupture of the briquette independently of the amount of tension on the briquette.

Our No. 1 machine, as shown, may either be used absolutely automatic or the lever system may be kept in a horizontal osition during the test by turning the crank shown at the base, which takes up the motion of the lever system. This device is ot essential excepting in our 2,000 lbs. capacity machine, where sufficient lever motion cannot be obtained and it must be aken up by the use of the crank.

The breaking load is weighed automatically on the scale placed on the frame of the machine so that the operator can atch the application of the load and knows at any instant exactly what load is on the briquette when it breaks, and it can thus e jotted down without further manipulation or calculation.

The small hand wheel for adjusting the lower clip is arranged so that it will automatically slip on the adjusting screw as oon as a predetermined load has been applied to the briquette. This hand wheel having been properly adjusted, there can be o strain on the briquette or danger of premature fracture of briquette by further turning the hand wheel.

This machine has a maximum strength, stiffness and durability and is the most quickly operated cement tester made.

The latest type of A. S. C. E. Standard Roller Clips are also provided with these machines.

This machine may also be provided, at an additional cost, with Compression Test Tools, as per upper illustration, page 25, r testing 1-inch cubes, or with Transverse Test Tools, as per lower illustration, page 25. The Transverse Test Tools, as shown, e arranged for 4 inches between supports, but any other desired length may readily be obtained. With these tools, the achine is equipped for coke, clay or glass tests, as well as all classes of cement tests.

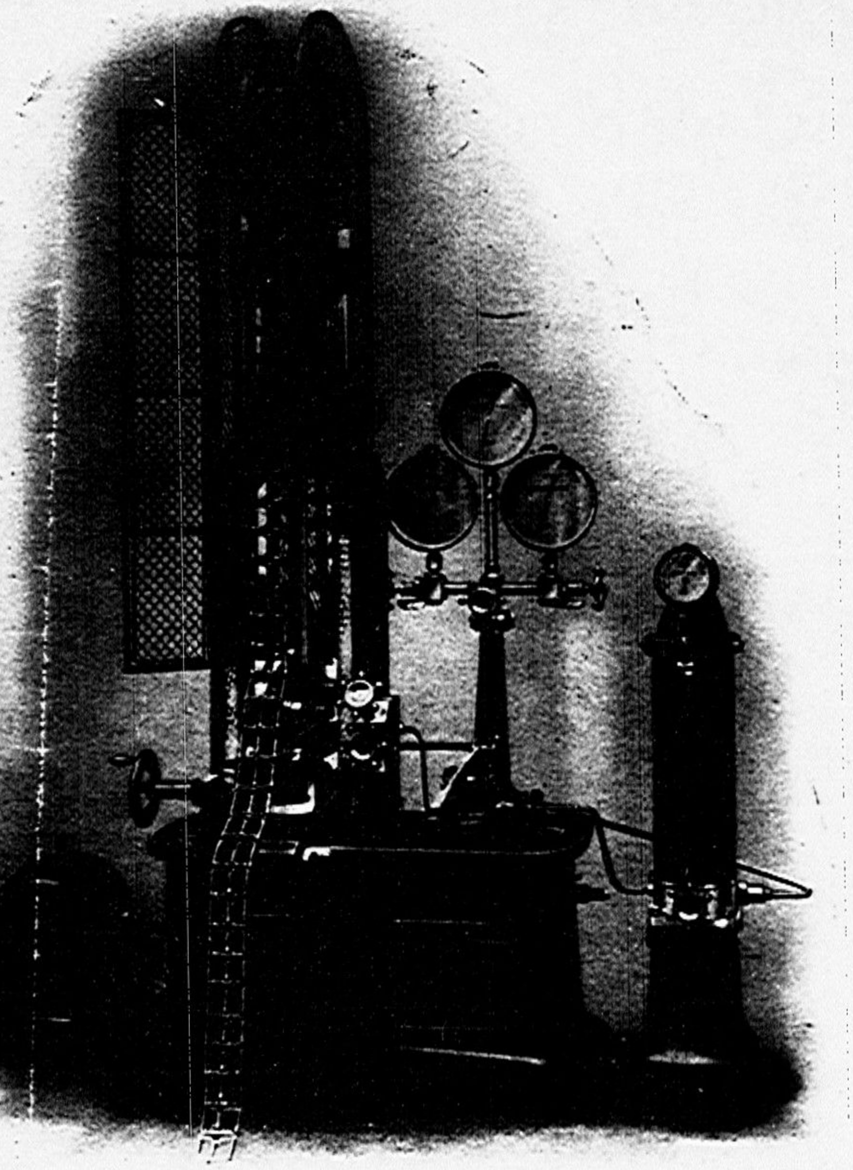


Abb. 7. Materialprüfmaschine MP, für alle Versuchsarten und mit Einrichtung zur Kettenprüfung (Patent). Ausgerüstet mit 3 Rohrfeder-Manometern.

Normalzubehör:

1 Differentialkolbenpumpe (bei Handbetrieb mit veränderlichem wirksamen Kolbenquerschnitt),
1 Einspannvorrichtung für Stäbe von 20 mm Durchmesser, bestehend aus:
  1 oberen und 1 unteren Schieber,
  2 Paar gehärteten und geschliffenen Beilagschalen, dazu
  2 Paar gehärtete und geschliffene Kugelringe,
1 Normalstab, 20 mm, als Muster,
1 Dehnungsmesser,
1 Vorrichtung für einfache Druckproben bis 40.000 kg, bestehend aus:
  1 unteren und 1 oberen Druckteller mit gehärteten und geschliffenen Kugelschalen,
1 Einsatzstück für Brinell'sche Kugeldruckproben, mit Kugel von 10 mm Durchmesser,
1 Brinell-Mikroskop zum Messen des Kugeldruckdurchmessers, mit einer Millimeterskala bis 7 mm und einer Sonderteilung zum direkten Ablesen der Zerreißfestigkeiten bei Eisen- und Stahlsorten von 35 bis 100 kg Zerreißfestigkeit, mit Justierplatte und Gebrauchsanleitung,
1 Satz Schraubenschlüssel,
1 Tabelle der Brinell'schen Härtezahlen,
1 Betriebsanleitung.

Bei Ausrüstung mit Pendel-Manometer ferner:

1 Pendel-Manometer für 3 Meßbereiche (0—4000 kg, 0—12.000 kg, 0—40.000 kg) mit
  1 Diagrammschreibapparat einschl. 100 Diagrammblätter und Uhr zur Einstellung der Belastungszunahme,
1 Elektromotor 0,2 PS für das Pendel.

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

je 1 Manometer bis 10.000 kg und 40.000 kg Maximalbelastung,
1 Eichtabelle zum Ablesen der wirklichen Belastung.

Sonderzubehör:

Biegevorrichtung für Festigkeitsbiegeproben, einschließlich Faltversuch,
Einspannvorrichtung für 12 mm Stäbe bestehend aus:
  2 Paar gehärteten und geschliffenen Beilagschalen, Einspanngehänge und
  1 Proportionalstab, 12 mm, als Muster,
1 Martens-Kennedy-Zeigerapparat für 150 oder 100 mm Meßlänge,
1 Paar Verlängerungsstücke zum Prüfen kurzer Stäbe, mit Gewinde nach Wunsch,
1 Paar Muttern für Stäbe, mit Gewinde nach Wunsch,
1 Paar Einspannschieber für Flachmaterial sowie Rundmaterial ohne Köpfe,
1 Paar Eichschieber für Eichungen mit Martens'schem Spiegelapparat oder Meßdose,
je 2 Paar Beißkeile für Flachmaterial bis 50 mm Breite, und zwar: von 0—5 mm, 5—10 mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke,
je 2 Paar Beißkeile für Rundmaterial, und zwar: von 3—5 mm, 5—10 mm, 10—15 mm, 15—20 mm, 20—25 mm Stärke (für Rundmaterial von 0—3 mm dienen die Beißkeile für Flachmaterial von 0—5 mm),
1 Vorrichtung für Scherversuche an zylindrischen Stäben mit normal 12 mm, auf Wunsch mit 1—15 mm Durchmesser und 50 mm Länge,
1 Apparat für Lochversuche,
1 erhöhter Brinellkugelhalter für Brinellproben in Vertiefungen, mit Kugel von 10 mm Durchmesser,
Kontroll-Eichung mittels Meßdose durch den Surveyor des Lloyd's Register of Shipping (Meßdose wird mitgeliefert),
Meßdose allein,
Elektrischer Antrieb der Pumpe, kombiniert mit Handbetrieb (ohne Motor),
1 Elektromotor dazu von etwa 2 PS und zirka 1400 Touren pro Minute,
1 Akkumulator (hiebei muß auch der früher erwähnte elektrische Antrieb mitbestellt werden; Motor 3 PS).

Bei Ausrüstung mit Rohrfeder-Manometern ferner:

1 drittes Rohrfeder-Manometer für Feinablesung, bis 2000 kg Meßbereich,
1 Diagramm-Schreibapparat mit 100 Diagrammblätteren.

Für Spezialzwecke (Ketten-, Feder-, Drahtseil-, Baustoff-Prüfung, Warmzerreißversuche usw.) liefern wir Sonder-Einrichtungen bezw. -Ausführungen. Angebote darüber stehen zu Diensten.

Ausführlichen Katalog bitten wir zu verlangen!

Pl. Ex. 15

150

Materials Testing Laboratory of the University of Illinois under the immediate supervision of Prof. H. F. Moore.

Acknowledgment:

Funds for the investigation were provided in part from the A.S.T.M. Research Fund and in part by various industrial firms. The following furnished money, material, or both:

Dow Chemical Co.,
National Smelting Co.,
Aluminum Company of America,
Baldwin-Southwark Corp.,
American Brass Co.,
Westinghouse Electric and Manufacturing Co.,
General Cable Corp.
Bridgeport Brass Co.,
Chase Brass and Copper Co.,
International Nickel Co.,
Jones & Laughlin Steel Corp., and
University of Illinois.

The investigation was organized as a cooperative investigation sponsored by the A.S.T.M. and the University of Illinois. It is a part of the research program of the Illinois Engineering Experiment Station, M. L. Enger, Director, and is carried on in the Department of Theoretical and Applied Mechanics, of which F. B. Seely is head.

Speed Effect in Material and in Testing Apparatus:

The effect of speed of loading or of rate of strain on the results of ordinary tension tests may be separated into three parts: (1) variation in results due to inertia effects in the testing machine or in the strain-measuring apparatus, (2) variation due to personal equation of the testing machine operator, and (3) variation in the tensile properties of a material under different rates of strain. It is the third of these causes of variation which is to be studied. Very little can be said about the personal equation of testing machine operators, except that it may cause a considerable deviation of results, especially in testing machines with a beam-balance weighing mechanism, which is the type of testing machine still most widely used in the United States, although machines with self-indicating weighing devices are fast coming into use. To avoid variations due to personal equation of operator the testing machine used in a study of effect of rate of strain should be fitted with a self-indicating and recording weighing mechanism.

There is a good deal of experience available to show that the rate of strain in a specimen for a given nominal speed of head of testing machine varies appreciably for different testing machines, for different types of grips, for different grips of the same type, for different materials, and for different types and lengths of specimens.

Since, then, the most important object of the tests described in this paper was to investigate the effect of *rate of strain* upon the yield strength, tensile strength, elongation, and reduction of area of tension test specimens of a variety of metals, the testing apparatus used gave autographic records on a time base for loads and stretches and was designed to reduce inertia of parts of the measuring and recording apparatus to a minimum.

Materials and Specimens:

A.S.T.M. standard ½-in. tension specimens[1] with a 2-in. gage length were used in all the tests to determine effect of rate of strain. Tests were made on specimens of the metals shown in Table I.

Description of Tests:

The tests were made in a 200,000-lb. capacity Riehlé screw-power testing machine, using the available free running head speeds of 0.05, 0.40, 1.0 and 8.0 in. per min.

---

[1] Standard Methods of Tension Testing of Metallic Materials (E 8 - 36), 1939 Book of A.S.T.M. Standards, Part I, p. 750.

The elongation of the specimen over a 2-in. gage length was measured by a strain gage shown in Fig. 1, which measures the change in drop of potential which occurs when a contact is moved along a resistance wire. Resistance wires were mounted to each of two insulating blocks, which were in turn fastened to opposite sides of a yoke by means of steel springs. The yoke was fastened to the specimen with three pointed screws, one of which was pressed against the specimen by a coil spring so that as the cross-section of the specimen diminished under axial tensile load the extensometer would not fall off from the specimen. The resistance wires pressed against contacts, which were fastened to, but insulated from, another yoke which was also fastened to the specimen with three pointed screws. Thus as the specimen elongated, increasing the distance between the yokes, the contacts were allowed to slide over the resistance wires which, when connected to a voltage supply, would produce a changing potential at the contacts. This potential was measured by means of an oscillograph. It was found that the resistance wires used were very uniform in resistance per unit of length, resulting in a linear relationship between change in potential at the contacts and displacement of the contacts. The sensitivity of this gage was very flexible, since it was a function of the voltage supply used and of the sensitivity of the oscillograph element. With the highest sensitivity used in obtaining yield strength of some of the non-ferrous metals, a strain of 0.00005 in. per inch (0.005 per cent) was represented by 0.01-in. ordinate on the oscillograph record. Successive calibrations at this sensitivity showed less than

TABLE I.—METALS TESTED IN INVESTIGATION OF EFFECT OF SPEED OF TESTING.

Metal	Approximate Chemical Composition, per cent												
	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Copper	Chromium	Magnesium	Iron	Aluminum	Nickel	Zinc	Lead
Low-alloy steel (Corten)	0.08	0.27	0.145	0.020	0.80	0.41	1.01	....	remainder	....	....	....	....
S.A.E. 1045 steel	0.44	0.75	0.014	0.021	0.21	....	....	....	remainder	....	....	....	....
S.A.E. 1020 steel	0.20	0.45	0.045	0.055	....	....	....	....	remainder	....	....	....	....
Stainless steel (18-8)[a]	0.20	0.70	0.125	....	0.35	....	18.0	....	remainder	....	8.0	....	....
Electrolytic copper, commercially hard	....	....	....	....	....	99.95+	....	....	....	....	....	....	....
Copper, hot-rolled	....	....	....	....	....	99.95+	....	....	....	....	....	....	....
Monel metal, annealed, cold-drawn	0.15	1.00	....	....	0.10	30.00	....	....	1.40	....	67.0	....	....
Duralumin, 17S-T	....	0.61	....	....	0.49	4.19	....	0.50	0.25	remainder	....	....	....
Sand-cast aluminum alloy Chill-cast aluminum alloy	....	0.3	....	....	5.0	0.4	....	0.05	0.8	remainder	....	....	[b]
Drawn magnesium alloy (Dowmetal J)	....	0.28	....	....	....	....	....	remainder	....	6.50	....	1.12	....
Cast magnesium alloy (Dowmetal H)	....	0.22	....	....	....	....	....	remainder	....	6.02	....	2.72	....
Brass, soft temper	....	....	....	....	....	69.69	....	....	0.01	....	....	30.23	0.07
Brass, drill temper	....	....	....	....	....	69.71	....	....	0.01	....	....	30.21	0.07

[a] Probably contains a small content of selenium or molybdenum.
[b] Titanium, 0.2 per cent.

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neither gage is appreciably affected by the rate at which it is loaded.

The load and strain measurements were recorded by means of a four-element oscillograph equipped with super-sensitive galvanometer elements of the oil-well type. The damped frequency of these elements is about 250 cycles per second. For the wave fronts produced in these tests the amount of over-shooting was negligible. It is realized, of course, that this method of recording would be unsuitable for extremely high rates of loading. The camera recording the deflection of these elements was driven by a 12-v. d.c. motor to provide the speeds of 0.35 to 200 in. per min. used in the tests. The light source used consisted of a 6 to 8 v., 2.5 amp. gas-filled oscillograph lamp which gave sufficient intensity of light to register on grade A Insurance Bromide paper. A timing wave on the oscillograph record was produced by an electric clock fitted with contacts giving impulses at intervals of 0.02 min. For the higher speeds, a 60-cycle alternating current was used as a timing wave.

Oscillograph Records of Tests:

Figure 3 shows a typical oscillograph record for a S.A.E. 1020 steel tested at a nominal head speed of 8 in. per min. The timing wave is at the top of the diagram, each impulse representing 1.2 sec. as noted. The curves represent load-time and stretch-time relations. If the stretch-time relation were linear, the two load-time diagrams would also represent load-deformation. However, the stretch-time diagram is not a straight line as can be noted but approximates a straight line in the plastic region.

For those steels which had well-defined yield points a sensitive strain gage was not needed. In obtaining yield strengths of the non-ferrous metals, some tests were run in which a more

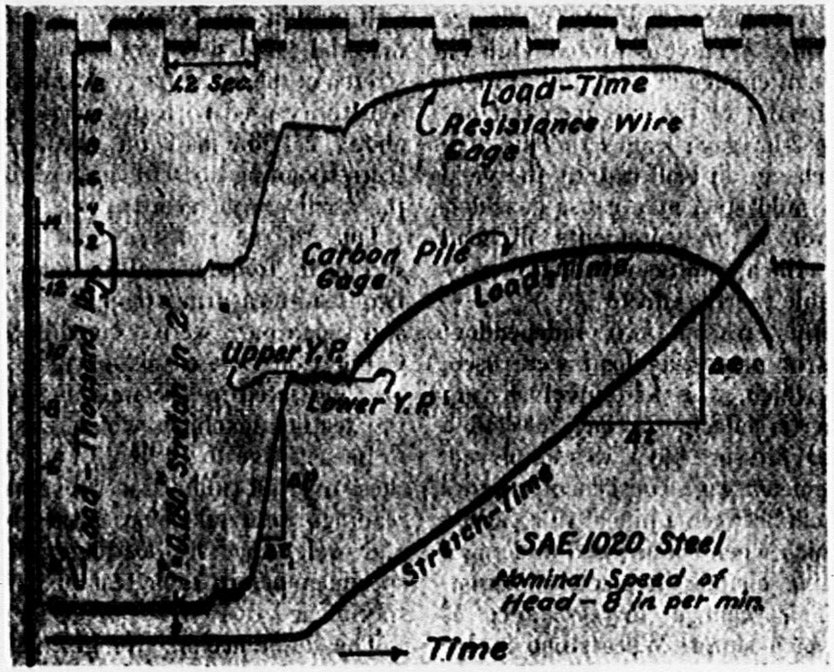


Fig. 3.—Typical Oscillograph Record.

sensitive strain gage and higher camera speeds were used. For these tests over-all load-time and stretch-time curves were not obtained. In other tests the strain gage was modified so that its sensitivity was automatically changed after the yield strength had been passed. This change in sensitivity of the strain gage was achieved by making electrical connection to the resistance wire at the position of the sliding contact when the yield strength was passed. By arranging the electrical circuit so that part of the wire carried considerably higher current than the other part, the two sensitivities were obtained.

By taking simultaneous readings of load deflection and strain deflection from the oscillograph records and referring to the proper calibration curve, data for stress-strain diagrams were obtained.

Relation of Properties to Rate of Strain: Yield Point and Yield Strength.—Figure 4 shows the relation between the yield point and yield strength of the various metals and the rates of strain in the elastic region. This rate of strain represents the average rate in the region from about one-half to three-fourths the yield strength value for the different materials. For convenience in plotting the wide ranges of strain rate, a logarithmic scale is used for abscissas. The general trend shows an increased yield strength with increase in strain rate. Exceptions to this are the soft-temper brass and the duralumin which show no definite change and the cast Dowmetal which indicates a *decrease* in strength with increased strain rate. Concerning the yield point of the steels there is a greater difference in upper and lower yield point for the Corten than for the other steels. The Corten was tested without the use of the weigh bar load gage. It is noted that there is less effect of speed on the lower yield point than on the upper yield point.

Tensile Strength.—Figure 5 shows the relation between the ultimate tensile strength and the rate of strain at the

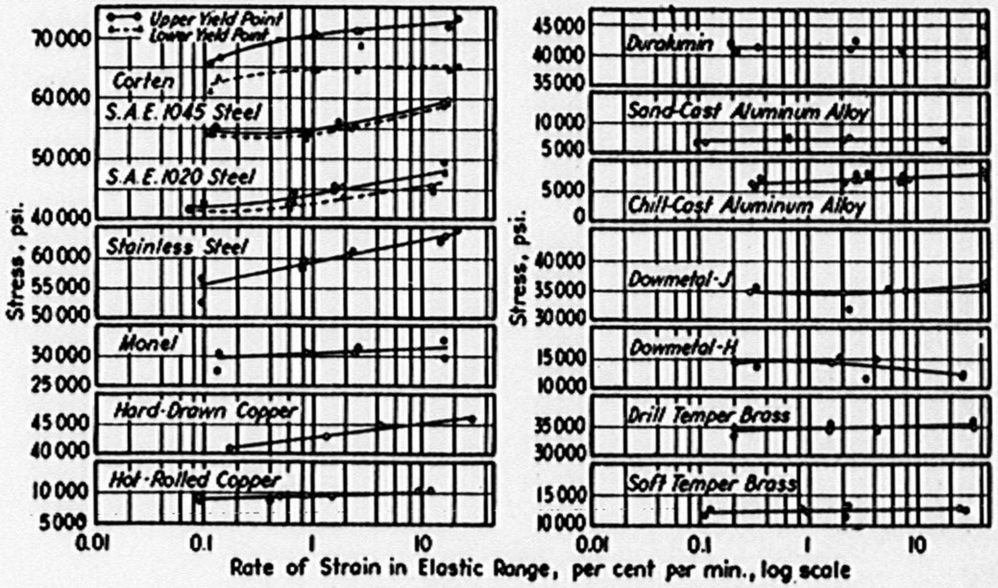


Fig. 4.—Effect of Rate of Strain on Yield Strength.

was rapidly decreasing causing elastic recovery in the machine, weigh bar, etc. The elongation was found from a measurement of the gage length after rupture. The cast aluminum alloys and the hard-drawn copper show increased elongation while all the other materials show a decreased elongation with increase in strain rate.

Reduction of Area.—Figure 7 shows the relation between reduction of area and rate of strain at fracture. The reduction in area for any one material follows the same general trend as does the elongation.

Results of Tests at Four Different Speeds of Testing:

It is evident from a glance at Figs. 4 to 7, inclusive, that a large change in rate of strain causes a relatively small change in the tension test results for the metals tested. That means that in any specifications for rate of strain to be allowed for any test wide tolerance for deviations from the precise rate desired will be allowable. From the data shown in Figs. 4 to 7, inclusive, Table II has been compiled, showing the percentage change in the properties of the metals tested due to doubling, quadrupling, and increasing eight-fold the rate of strain. The values in Table II were computed on the assumption that for speeds within the range of reliable action of the weighing mechanism the change of properties was proportional to the logarithm of the rate of strain. The illustrations show that this is quite closely true up to head speeds of 2 in. or over, and for accurate behavior in tests of metals on a commercial testing machine speeds should not be higher than this, else the weighing beam cannot be kept in proper balance, or, for a self-indicating weighing mechanism the pointer is likely to move "jumpily."

Again examining Table II it is seen that for the steels tested the largest variations of values for varying rates of strain are found in the upper yield point—the yield point as determined by the "drop of the beam." For steels which have a yield point, the lower yield point and the yield strength as determined by an offset from the straight-line part of a stress-strain diagram may, without serious error, be regarded as having the same value. The elongation in 2 in. seems to be more affected by change of rate of strain than any other of the properties, while the reduction of area is slightly affected even by an eight-fold increase in rate of strain.

It is not the function of the authors to specify what tolerances are suitable for rates of strain. They would point out, however, that for the steels, if it were specified that the rate of strain should be not less than N per cent per minute and not greater than $2N$, the effect on test results would be small and that it would not be very serious even for a tolerance from N to $4N$. Tensile strength values and reduction of area values for the steels tested would not be very seriously affected even if the limits of rate of strain were set at N and $8N$ per cent per minute, respectively.

Examining the changes in properties of the non-ferrous metals tested, the values of yield strength seem relatively little affected by change of rate of strain, nor do the values for tensile strength and elongation in 2 in., with the exception of the cast aluminum alloys and the cast magnesium alloy, whose elongation seems to be relatively sensitive to changes in rate of strain. The reduction of area for these three metals seems to be seriously affected by change of rate of strain.

Relation of Speed of Head of Testing Machine to Rate of Strain:

The custom of judging speed of testing by speed of head of testing machine has become pretty well fixed in the minds of American testing machine operators.

TABLE III.—RATIO (R) OF RATE OF STRETCH OF SPECIMEN IN GAGE LENGTH TO SPEED OF HEAD OF TESTING MACHINE.

Each tabulated value is the average of two test results on duplicate specimens.
Values of R are given in per cent.

Testing Machine	Nominal Speed of Head, in. per min.	Ratio of Rate of Stretch to Speed of Head									
		S.A.E. 1020 Steel[a]		S.A.E. 1045 Steel[a]		Duralumin (17S-T)[a]		Hard-Drawn Brass[a]		Hard-Drawn Copper[a]	
		Elastic	Plastic	Elastic	Plastic	Elastic	Plastic	Elastic	Plastic	Elastic	Plastic
SPECIMENS HELD IN WEDGE GRIPS, 8-in. GAGE LENGTH											
100 000-lb. Riehlé	0.10	6.21	55.0	8.47	44.7	13.40	36.1	10.80	10.0	10.50	25.0
	0.61	6.41	42.3	8.77	44.9	13.40	50.6	12.70	25.4	10.90	38.1
100 000-lb. Olsen	0.05	2.80	52.6	4.31	53.3	8.54	35.7	7.36	48.6	5.78	18.3
	1.04	3.17	53.0	4.38	54.1	8.26	50.4	7.44	45.3	5.63	34.3
50 000-lb. Riehlé	0.05	4.41	52.9	6.29	51.6	12.00	49.4	10.90	....	9.08	36.6
	0.78	4.59	52.7	6.42	51.5	12.00	54.0	11.30	....	7.74	33.4
SPECIMENS HELD IN WEDGE GRIPS, 2-in. GAGE LENGTH											
100 000-lb. Riehlé	0.10	1.58	22.3	2.32	16.7	4.16	19.7	3.42	49.7	2.88	8.9
	0.61	1.58	17.4	2.38	19.6	3.82	23.4	3.64	11.6	2.70	9.1
100 000-lb. Olsen	0.05	0.75	26.4	1.13	28.7	2.37	10.5	1.90	31.2	1.54	20.9
	1.04	0.75	25.0	1.12	26.2	2.04	19.7	1.88	19.8	1.40	16.5
50 000-lb. Riehlé	0.05	1.10	24.2	1.57	21.2	3.22	16.4	2.99	....	2.16	10.4
	0.78	1.29	21.3	1.58	22.0	2.90	16.9	0.99	....	1.66	4.4
SPECIMENS HELD IN SHOULDERED GRIPS, 8-in. GAGE LENGTH											
100 000-lb. Riehlé	0.10	12.0	96.6	18.0	97.6	30.0	80.8	29.1	100.0	24.0	89.1
	0.61	14.6	88.1	14.7	93.2	26.4	88.9	29.4	103.0	19.0	101.0
100 000-lb. Olsen	0.05	11.3	83.3	13.8	96.4	27.0	76.2	20.3	95.6	16.7	97.4
	1.04	13.4	84.8	9.1	87.5	23.0	85.2	20.7	95.6	15.9	94.3
50 000-lb. Riehlé	0.05	15.3	83.4	11.2	78.7	40.9	82.4	28.3	84.4	21.5	82.9
	0.78	15.3	100.0	15.5	97.2	32.6	93.5	31.1	110.0	23.6	85.0
SPECIMENS HELD IN SHOULDERED GRIPS, 2-in. GAGE LENGTH											
100 000-lb. Riehlé	0.10	5.33	93.3	5.50	74.3	9.79	70.8	10.40	85.9	7.67	88.9
	0.61	2.71	70.1	4.80	75.5	8.02	68.5	9.96	93.4	6.96	89.0
100 000-lb. Olsen	0.05	3.42	86.6	4.87	70.4	8.16	70.4	6.42	97.2	6.96	90.2
	1.04	3.84	68.0	4.95	57.3	6.53	61.7	6.81	74.7	6.07	93.6
50 000-lb. Riehlé	0.05	2.90	73.6	3.93	88.4	11.60	60.6	15.40	100.0	7.63	88.1
	0.78	2.42	93.3	3.63	87.0	12.60	57.0	10.30	101.0	9.77	96.1

[a] The term "elastic" applies to the range of load from about one-third the yield strength to yield strength. The term "plastic" applies to the range of load in the region of "ultimate" (maximum) load.

This is largely because at the present time the majority of testing machines in commercial service in this country are screw-power machines with a balance beam for weighing the load. The speed of head is fixed by the train of gears used, and usually there are four, six, or eight speeds of head available, through gear changes. The speed of head can be readily predicted for a screw-power machine, but not very closely controlled. By way of contrast in a hydraulic press type of testing machine the speed of head can be very closely controlled but not so accurately predicted as in a screw-power machine in good mechanical condition.

A series of tests was run in the Talbot

speed of head of testing machine may then be computed on the assumption that rate of strain is proportional to speed of head. Then that speed of head can be selected which will give most closely the desired rate of strain.

Consider next tests with a hydraulic testing machine. In most hydraulic machines one or more of the valve wheels is graduated so that duplicate settings can be made. After the oil in the testing machine cylinder has been warmed up by running the head up and down, or by making a few dummy tests, there is usually a fairly good correlation between setting of valve wheel and speed of head of testing machine. This correlation may well be checked for one or two settings before starting a series of tests. Using the valve setting to determine the speed of head, the rate of strain in the plastic range for any speed of head may be determined as in the case of the screw-power machine. Then the speed of head to give the desired rate of strain may be computed and the proper valve setting for the test determined.

APPENDIX

VARIATION FROM THE MEAN VALUE OF THE RATIO OF RATE OF STRETCH TO SPEED OF HEAD IN TESTS AT DIFFERENT SPEEDS AND IN DUPLICATE TESTS

In this further study of the ratio between rate of stretch of specimen and speed of head of testing machine the following symbols will be used:

R = the ratio of rate of stretch of specimen to nominal speed of head of testing machine in inches per minute,

R_f = the above ratio for the fastest speed used with a given testing machine, and

R_s = the above ratio for the slowest speed used with the same testing machine.

Taking all the values of R_s and R_f given in Table III, the average value of R_f/R_s is found to be 1.02 or 102 per cent. However, there are wide variations from this mean value in the case of individual tests.

It is felt that these variations from mean value are not to be attributed wholly to the varying speeds of testing for different tests. Light is thrown on this point by a comparison of the average deviation from the mean value of R for two arrangements of the test data: (1) An arrangement in which is studied the average deviation of average values of two tests for each of two speeds for each testing machine (data given in Table III), and (2) an arrangement in which is studied the deviation from the mean of the value of R for each of the two specimens in each pair of duplicate tests made (data not given in Table III, only the average for each duplicate pair of tests, data on file at the Talbot Laboratory).

For the two speeds for each machine the upper part of Table IV shows the average values of deviation R from the mean value for different metals, different gage lengths and different grips. The general average of this deviation is 6.86 per cent.

The lower part of Table IV shows the deviation of R for duplicate tests of specimens with speed, gage length, machine, and metal the same for each specimen of a pair. The general average of this deviation from the mean is 8.03 per cent.

Now it seems to the authors that these figures indicate that the effect of varying speed on variation of values of R was not greater than the effect of variation of metal in the duplicate specimens of a pair.

In connection with Table IV attention is called once more to Table II. From the values in Table II it is seen that even if an error as high as the greatest deviation in Table IV (23.2 per cent) were introduced into the rate of strain, the effect on any of the mechanical properties of any of the metals tested would be less than 1.65 per cent (except for the rather uncertain small reduction of area for the cast aluminum alloys and the cast magnesium alloy). This figure is based on the approximate proportionality of change in mechanical property value to the logarithm of the change in rate of strain.

TABLE IV.—AVERAGE FOR THREE TESTING MACHINES OF THE DEVIATION FROM THE MEAN VALUE OF R.

Values are given in per cent.

Grips	Gage Length, in.	Metal									
		S.A.E. 1020 Steel		S.A.E. 1045 Steel		Duralumin		Brass[a]		Copper	
		Elastic Range	Plastic Range	Elastic Range	Plastic Range	Elastic Range	Plastic Range	Elastic Range	Plastic Range	Elastic Range	Plastic Range
AVERAGE OF TWO TESTS FOR TWO SPEEDS (computed from data in Table III).											
Wedge	8	3.26	4.54	1.19	0.34	0.55	12.96	....	....	3.72	18.59
Wedge	2	2.69	7.14	0.68	4.79	5.66	13.50	....	....	7.03	17.84
Shouldered	8	6.09	4.72	15.40	5.88	8.83	5.60	....	....	6.73	3.72
Shouldered	2	15.80	12.70	3.86	3.93	8.39	3.76	....	....	8.00	1.99
Average		6.97	7.28	5.28	3.72	5.85	8.95	....	....	6.38	10.50
General Average, 6.86											
DEVIATION FROM MEAN FOR PAIRS OF DUPLICATE TESTS.											
Wedge	8	3.06	2.12	2.53	6.26	3.54	10.00	....	....	2.87	20.70
Wedge	2	4.90	6.47	3.66	8.43	5.69	5.59	....	....	5.93	23.20
Shouldered	8	7.77	7.05	8.74	2.72	8.91	7.29	....	....	14.20	3.80
Shouldered	2	20.60	5.32	13.50	14.20	7.08	8.86	....	....	7.25	4.66
Average		9.08	5.24	7.08	7.90	6.30	7.92	....	....	7.58	13.10
General Average, 8.03											

[a] The tests of hard-drawn brass rod held in wedge grips showed so much slipping in grips and mashing of ends of specimen that the results of all tests on brass rod have been omitted from this table, since to include some values for brass and exclude others would unbalance the general average.

Plaintiff's Exhibit 17 Amsler Testing Machine Catalog.

522 Amsler Testing Machines and Instruments

General Catalogue

G. C. 26

* * * * * * * * * *

524 Alfred J. Amsler & Co., Schaffhouse (Switzerland)

Description No. 312

into the pess cylinder. On opening a release valve arranged near the pump, the press cylinder is unloaded and the weight of the ram expels the oil contained in the cylinder into the reservoir. The pump rams are so made that no cup-leathers are required. The Cam pump No. 14 and the electric motor are also fixed to a rail at the side of the press.

The main part of the measuring arrangement is a large, strong, helical spring, which stretches in proportion to the pressure being exerted, and this elongation of the spring is communicated to a pointer which moves round a dial and indicates the load being applied by the machine. A cylinder with a small ground piston is connected by a pipe with the working cylinder of the press. The little piston moves down under the influence of the oil pressure, and presses on the frame which is suspended on the lower end of the measuring spring. Thus the spring, the upper end of which is suspended on a fixed pin, is subjected to deformation proportional to the pressure of the liquid. A bye-pass valve placed in the end of the pipe leading into the cylinder of the measuring apparatus is provided to prevent the too sudden release of the spring when the test piece breaks. This valve, however, allows the oil under pressure to freely enter the cylinder whilst the measuring spring is stretching.

The measuring spring is so strong, and is subjected to such a comparatively feeble force, that it is practically unbreakable and invariable, and consequently it has hardly any need of a subsequent standardising. Moreover, the travel of the spring is so large, about 4 in. (10 cm) that slight inaccuracies in the measuring arrangement exercise no appreciable influence on the exactness of the load indication. On account of their small mass, the moving parts of the load measuring apparatus only offer a very slight resistance due to inertia when they are displaced, and thus they follow instantly every change of load, so that the arrangement indicates the load exactly, even during extremely rapid working of the machine. On account of the long travel of the spring, the pulsations of the pump are harmless, seeing that they act on the pump body not violently, but in the manner of gradually increasing waves of pressure.

After the test piece breaks, the indicating pointer comes back slowly to the zero of the dial. A loose pointer, engaged by the indicating pointer as it rises, remains in the highest position reached, whilst the fixed pointer returns to zero, and it thus indicates the maximum load attained. One complete turn of the pointer corresponds to a load of 500 tons. The dial is so graduated that the load can be read directly to the nearest full ton. The distance between the graduations corresponding to one ton is just a little more than 1 mm, so that fractions of a ton can easily be estimated.

The working ram of the press is rendered oil tight by means of a cup leather. The joint is so made that on the one hand, only a very small leakage of oil takes place, whereas on the other hand the frictional resistance is hardly perceptible. This frictional resistance is so small that for loads above 30 tons it is less than one per cent, and for loads below 30 tons less than ± half a ton, and this degree of exactness does not alter appreciably in the course of time.

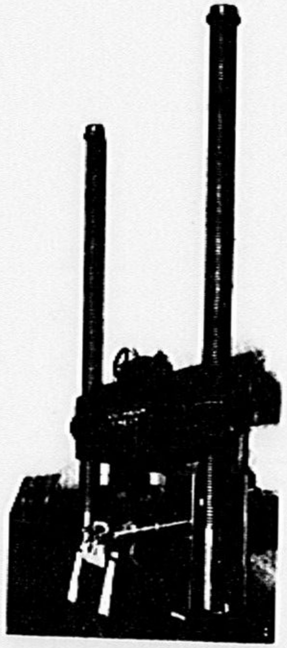
The machine is placed directly on the floor. It is not necessary to bolt it down to the floor, as it is sufficiently stable without being fixed.

Height of the standard press...	9 ft. 10 in.	or	3 metres
Floor space occupied...	4 ft. by 2 ft. 11 in.	“	120×90 cm
Net weight of the machine, about	9,100 lbs.	“	4,500 kg.
Gross weight	10,575 lbs.	“	4,800 kg.
Size of packing case........	190 cubic ft.	“	5½ m^3

Instead of the spring dynamometer, a Pendulum Dynamometer can be used for load measurement. The pendulum dynamometer is placed on the floor beside the press as a separate unit. The hand pump No. 2 is then of no service and for producing the load a motor driven No. 14 Cam Pump, fitted to the pendulum dynamometer, is used.

SOUTHWARK - EMERY
TESTING EQUIPMENT

UNDER LICENSE FROM EMERY-TATNALL COMPANY



1,000,000-lb. Universal Testing Machine.

Courtesy, Gould Coupler Co.

SOUTHWARK FOUNDRY AND MACHINE CO.
PHILADELPHIA, PA.

Printed in U. S. A.

J. T. P. 3MC—1-30

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to operate without any further trouble. Three-dial machines require an instrument board too large to be shipped fully assembled. In such cases, an engineer is sent from the A. H. Emery Company, or the Southwark Foundry and Machine Company, to make final assembly of the dial system and an acceptance test in the purchaser's laboratory, the cost of this service having been included in the quoted price.

In addition to being both simple and rugged, the Emery Weighing System is fool-proof; for it goes on working automatically without anyone ever touching it except to check the oil depth at infrequent intervals. In addition to overcoming the greatest source of error in the hydraulic testing machine, the Southwark-Emery apparatus can perform many extra services for the operator. For instance:—

Unloading tests can be carried out with the same facility as the loading tests. There is no hysteresis in the Emery Weighing System.

Loads can be held at fixed values despite creep in the test-piece.

Loads may be run rapidly up and down the scale by definite increments, working from any datum whatever. Loads will hold fast at each increment for any length of time desired to take readings of the instruments that measure the deformation of the test-piece.

The load on the test-piece is indicated at all times on the dials. The dials give a complete picture of all that takes place in the specimen during the test. When the test starts, they show up any slipping in the grips, or any readjustment of compression faces. The dials continue to show, at the yield point, the peculiar sequence of load release and the characteristic load pulsations.

A fine red idler hand running on a spindle held in watch-jewel bearings is carried along by the black pointer to mark the maximum load values. After the black pointer has deposited the red hand, it will fall away to the fracture point, thence back to zero.

The dial-hand will follow the most rapid-loading speeds, and all manner of repeated loads, showing the maximum and minimum points of each cycle.

The machine will apply loads either at constant rate of loading or at constant speed of travel of the ram. The loads may be applied at any speed, and speeds may be changed at will during the test.

The laboratory of the A. H. Emery Company, at Stamford, Conn., is open to visitors at all times. A personal visit will convey more to the student of materials-testing methods than any written description. There is a demonstration-testing laboratory at the Southwark plant, in Philadelphia, where a testing machine in full operation, together with recording apparatus, invites the inspection of engineers. Demonstration tests will be performed on any specimens presented. The same invitation is extended to engineers to visit the electrical instrument laboratory in charge of O. S. Peters, at 930 H Street N. W., Washington, D. C. At this latter laboratory, research work on electric recording apparatus and transmitting systems is being carried out. This includes high frequency recording with oscillographs.

Pl. Ex. 18

Pl. Ex. 19

FOR

TESTING MATERIALS

AFFILIATED WITH THE
INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS

71

PROCEEDINGS

OF THE

12254

TWENTIETH ANNUAL MEETING

Held at Atlantic City, New Jersey
June 26–29, 1917

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1917

Pl. Ex. 19

EFFECT OF RATE OF APPLICATION OF LOAD ON THE COMPRESSIVE STRENGTH OF CONCRETE.

By D. A. Abrams.

Experience in testing structural materials has shown that the ultimate strength and other properties of the material are affected by the rate of application of load. The importance of this subject is recognized in certain forms of testing. For instance, in tests of metal certain limits in the rate of application of load are recommended. A definite rate of loading forms an essential feature of the specifications for tension tests of cement briquettes.

In order to arrive at standard methods for making compression tests of concrete, it is essential that the influence of different rates of loading be fully understood. The tests described were carried out for the purpose of securing information on this subject.

Compression tests were made on 270 concrete cylinders, 6 in. in diameter by 12 in. long, mixes 1 : 9, 1 : 5 and 1 : 3, the aggregate being graded up to 1½ in. All tests were made at the age of 28 days by two methods, which are as follows:

Method No. 1.—About 10 per cent of the total load was applied at a fast speed (0.25 in. per minute); the remainder of load at rates varying from 0.006 to 0.15 in. per minute.

Method No. 2.—The cylinders were loaded to 3 to 88 per cent of their maximum load at a fast speed (about 0.25 in. per minute); the remainder of the load was applied at about 0.01 in. per minute.

These tests were made as a part of the experimental work on concrete and concrete materials being carried out by the Structural Materials Research Laboratory, Lewis Institute, Chicago.

Materials and Test Specimens.

The concrete was made from Portland cement, sand and pebbles. The aggregate was obtained from the Hammond, Ill., pit of the Chicago Gravel Co.

Prior to use a quantity of sand sufficient for this series was thoroughly mixed and placed aside. The pebbles were screened into three sizes and recombined for each test specimen. Tests on samples of the aggregate as weighed out for use on six different days gave the average sieve analysis shown in Table I.

The mixes were proportioned by volume, using one volume of cement to 3, 5 or 9 volumes of mixed aggregate. The material for each cylinder was proportioned and mixed separately. The concrete was mixed by hand by means of a bricklayer's trowel, using shallow flat-bottomed galvanized iron pans about 24 by 27 in.

The consistency was such that only a small quantity of free water was brought to the surface by puddling as hereinafter described. The amount of water used was 6.2, 7.0 and 8.0 per cent of the weight of dry materials in the 1 : 9, 1 : 5 and 1 : 3 mixes, respectively.

Table I.—Average Sieve Analysis of Aggregate.

Sieve No.	Size of Square Opening, in.	Amount Finer than Each Sieve, per cent by weight.
100	0.0058	1
48	0.0116	3
28	0.023	14
14	0.046	23
8	0.092	33
4	0.185	41
⅜ in.	0.37	51
¾ in.	0.75	73
1½ in.	1.5	100

The test specimens were molded by placing the concrete in metal forms in layers of 3 to 4 in. in thickness, puddling with a ¾-in. steel bar about 2 ft. long. The forms were provided with machined cast-iron base plates. After puddling the last layer the concrete was leveled off with the trowel. In order that the specimens might present plane surfaces to the bearing plates of the testing machine, the tops were capped by means of a layer of neat cement paste about 2 to 4 hours after the con-

crete was placed. The cap was made smooth by pressing down a piece of plate glass which was left in place until the form was removed.

The specimens were left in the forms one day and then removed and stored in damp sand until 28 days old. Each set of specimens consisted of 6 cylinders, which were made on 6 different days.

METHOD OF LOADING.

A 200,000-lb. Olsen testing machine was used. The two methods of applying the load used in the tests have been previously described. The rate of loading was determined by direct measurements of the shortening of the cylinder during the test. In the machine used, the rate of application of load varies somewhat with the amount of load; consequently, the indicated rates are the averages for the six tests in a set. It should be noted that the rate of loading is not the same as the rate of movement of the machine head when running idle; the idle speed may be 2 to 4 times as fast as the speed under load, due to the deflection of the levers, elongation of screws, compression of cushions, etc.

DISCUSSION OF TESTS.

Table II gives the average values from the tests by method No. 1, in which all cylinders were loaded to about 10 per cent of their maximum, before applying the remainder of the load at rates varying from 0.006 to 0.15 in. per minute. The curves shown in Fig. 1 indicate that the strength of all mixes is appreciably affected by varying the rate at which the load is applied throughout the test. The relative effect seems to be a function of the strength and modulus of elasticity of the concrete. When shortened at the rate of 0.15 in. per minute the cylinders showed a compressive strength 6, 14 and 20 per cent higher than when loaded at 0.006 in. per minute, for the 1 : 9, 1 : 5 and 1 : 3 mixes, respectively.

The tests made by method No. 2 (see Table III and Fig. 2) show that the compressive strength of concrete is not affected by applying as much as 88 per cent of the maximum load at a fast speed, providing the remainder of the load is applied at a slow speed; in other words, it is the rate of application of only the last 12 per cent (or less) of the load that affects the compressive strength of the concrete.

The relative effect of different rates of application of load appears to depend on the modulus of elasticity and the compressive strength of the concrete. For concrete made and stored in the same way there is a nearly constant relation between the modulus of elasticity and the compressive strength; consequently the results of these tests may be considered of general application within the range of loads used, for specimens stored in a damp place. For specimens stored under different conditions the results may not apply directly.

TABLE II.—EFFECT ON RATE OF APPLICATION OF LOAD ON THE COMPRESSIVE STRENGTH OF CONCRETE.

METHOD NO. 1.

Load of about 10-per-cent maximum was applied at a fast speed (0.25 in. per minute); remainder of load applied at rates shown.

Specimens were 6 by 12-in. cylinders.

Age at test 28 days; stored in damp sand, tested damp.

Rates of movement of the machine head were determined by direct measurement of the shortening of the cylinder during loading. In this machine the rate of motion of the head for a given speed varies somewhat with the amount of load, so that the speeds given are the averages for tests of six specimens in a set.

Each value is the average of 6 tests. The cylinders in a set were made at intervals of 1 to 4 days.

Reference No.	Rate of Movement of Machine Head, in. per min.	Compressive Strength, lb. per sq. in.		
		1 : 9 Mix.	1 : 5 Mix.	1 : 3 Mix.
1	0.006	800	1740	2840
2	0.010[a]	800	1790	2910
3	0.015	820	1870	3140
4	0.035	800	1950	3210
5	0.040	850	1920	3260
6	0.060	840	1980	3320
7	0.150[b]	850	1970	3400

[a] Usual rate of loading for compression tests of concrete made in this Laboratory. The rate of movement of the head when running idle is considerably higher than the values given; for the lower rates the idle speed is 2 to 4 times the shortening of a 12-in. cylinder under load.

[b] Fastest speed at which a proper determination of the maximum load could be obtained.

These results have a direct bearing on standard compression tests of concrete, since such tests are generally made on concrete stored in a damp place. In general, the rate of loading which can be used satisfactorily will fall between 0.01 and 0.02 in. per minute. This, of course, refers to the actual rate of shortening of a 12-in. test specimen. A rate below 0.01 in. per minute unnecessarily prolongs the time required for testing; a rate faster than 0.02 in. per minute offers no advantages, especially since there is shown to be no objection to loading the specimen well up to the maximum at a faster speed. The richer mixes (1 : 5 and 1 : 3) show about 7 per cent higher strength when loaded at 0.02 in. as compared with 0.01 in. per minute.

On account of variations in the action of testing machines of different capacities and designs, it is impracticable to adhere strictly to a certain predetermined rate of loading. It is suggested that the specimens be loaded from 50 to 75 per cent of maximum at a fast speed, and that the remainder of the load be applied at speeds which will give a shortening of the specimen of 0.01 to 0.02 in. per foot of length per minute.

TABLE III.—EFFECT OF RATE OF APPLICATION OF LOAD ON THE COMPRESSIVE STRENGTH OF CONCRETE.

METHOD No. 2.

Three to 88 per cent of the total load was applied at fast speed (0.25 in. per minute.) The remainder of the load was applied at about 0.01 in. per minute.
Specimens were 6 by 12-in. cylinders.
Age at test 28 days; stored in damp sand, tested damp.
Each value is the average of six tests made on six different days.
See Table IV for details of tests.

Reference No.	1 : 9 Mix.			1 : 5 Mix.			1 : 3 Mix.		
	Percentage of Total Load Applied at Fast Speed.	Compressive Strength, lb. per sq. in.	Mean Error, per cent.	Percentage of Total Load Applied at Fast Speed.	Compressive Strength, lb. per sq. in.	Mean Error, per cent.	Percentage of Total Load Applied at Fast Speed.	Compressive Strength, lb. per sq. in.	Mean Error, per cent.
1.....	10	770	11.2	5	1800	3.4	3	3120	7.5
2.....	12	780	8.5	11	1820	6.1	12	3050	8.7
3.....	25	770	7.5	22	1850	2.9	21	3040	5.4
4.....	45	760	11.2	42	1860	4.8	42	2970	3.9
5.....	59	760	5.5	60	1870	5.5	61	3040	3.9
6.....	70	780	9.9	68	1860	5.9	68	3070	5.4
7.....	79	800	7.5	77	1850	3.1	79	3000	5.0
8.....	86	780	8.0	88	1800	8.9	88	3020	4.0
Grand Av.	....	776	8.7	....	1841	5.1	....	3038	5.5

MEAN ERROR OF TESTS.

The tests made by method No. 2 gave results which are practically independent of variations in loading. Therefore, these values have been used as a study of the mean errors of tests made on the same day as compared with similar tests made on different days. The details of the tests made in this way are given in Table IV, which shows results of tests of specimens made on the same day, together with the corresponding averages and mean errors. Likewise, the averages and mean errors are given for specimens made and tested on different days.

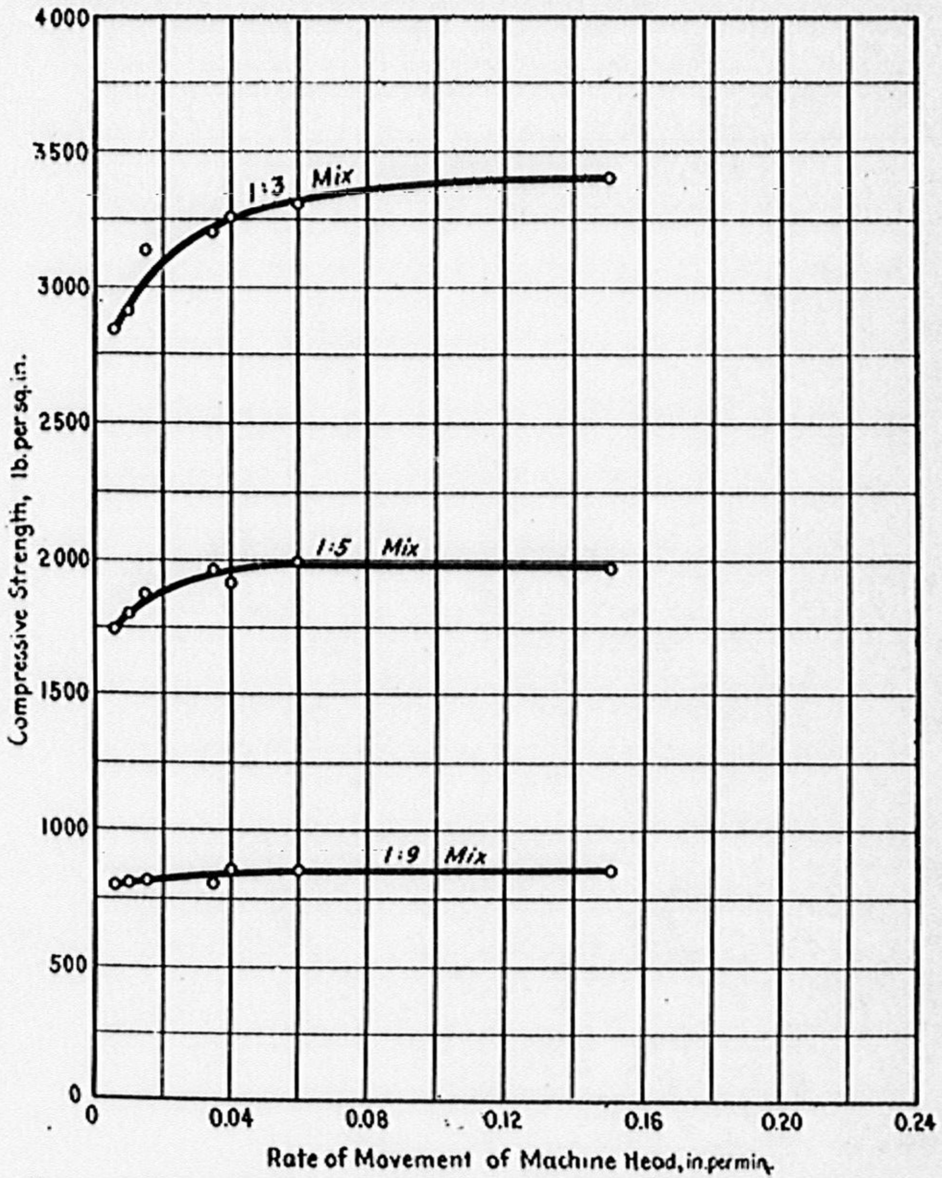

FIG. 1.—Effect of Rate of Loading on Compressive Strength of Concrete. Method No. 1 (see Table II for details).

All mean errors were computed by the formula:

$$\sqrt{\frac{\Sigma v^2}{n-1}}$$

where v is the difference between the individual value and the

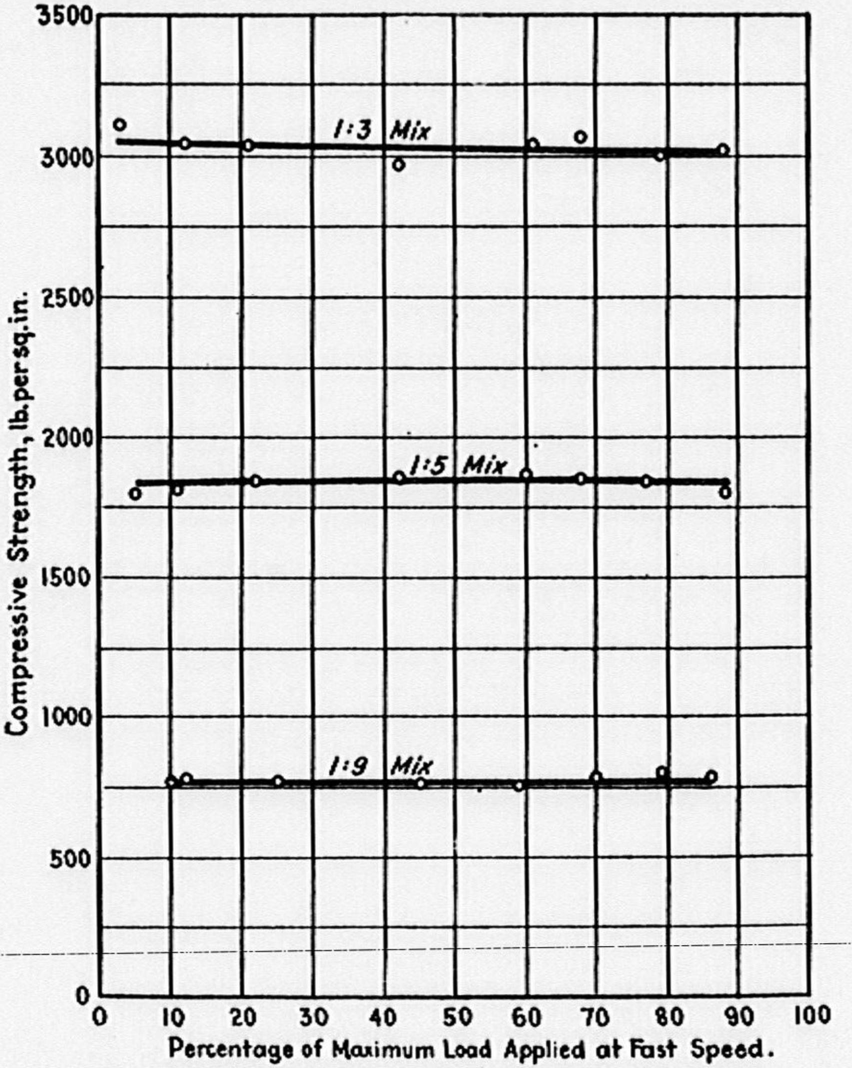

FIG. 2.—Effect of Rate of Loading on Compressive Strength of Concrete. Method No. 2 (see Tables III and IV for details).

average, and n is the number of tests considered. The mean errors of the averages were referred to the grand averages.

Attention is here recalled to the fact that each specimen was made from a single batch of concrete which was proportioned and mixed separately. This method of making the speci-

TABLE IV.—A STUDY OF MEAN ERRORS OF TESTS MADE BY METHOD NO. 2.

Three to 88 per cent of the total load was applied at a fast speed (0.25 in. per minute); the remainder of the load was applied at about 0.01 in. per minute.

See Table III for percentages of total load which were applied at fast speed.

On account of the uniformity of the test results the variations in the methods of application of load are disregarded here.

Reference No.	Compressive Strength, lb. per sq. in.							Mean Error, per cent.
	First Day.	Second Day.	Third Day.	Fourth Day.	Fifth Day.	Sixth Day.	Average.	
1:9 Mix.								
1	930	730	800	780	720	690	770	11.2
2	890	720	810	780	780	710	780	8.5
3	830	770	840	760	730	690	770	7.5
4	900	710	770	810	670	700	760	11.2
5	810	730	790	790	730	710	760	5.5
6	920	750	780	790	750	690	780	9.9
7	850	720	860	820	790	730	800	7.5
8	830	700	880	750	810	730	780	8.0
Average	870	730	820	790	750	710	776[a]	8.7
Mean error, per cent	5.3	3.1	4.9	3.0	6.0	2.4	4.1	8.6[b]
1:5 Mix.								
1	1840	1790	1870	1840	1700	1770	1800	3.4
2	1790	1910	1950	1830	1840	1630	1820	6.1
3	1870	1910	1880	1880	1790	1780	1850	2.9
4	1910	1860	1980	1870	1850	1710	1860	4.8
5	1920	1840	1930	2020	1780	1750	1870	5.5
6	1920	2020	1890	1840	1750	1730	1860	5.9
7	1910	1880	1890	1880	1810	1760	1850	3.1
8	1990	1880	1950	1690	1640	1640	1800	8.9
Average	1890	1890	1920	1860	1770	1720	1841[a]	5.1
Mean error, per cent	3.2	3.5	2.1	4.9	3.9	3.4	3.5	4.2[b]
1:3 Mix.								
1	3370	3310	2890	2790	3160	3220	3120	7.5
2	3190	3380	2630	2890	3180	3020	3050	8.7
3	3190	3180	2760	3020	3120	2960	3040	5.4
4	3120	3020	2910	2820	3070	2890	2970	3.9
5	3160	3100	2830	2980	3110	3050	3040	3.9
6	3340	3150	2930	3000	2890	3110	3070	5.4
7	3180	2880	3060	2760	3030	3070	3000	5.0
8	2960	3160	3070	3010	2840	3070	3020	4.0
Average	3190	3150	2890	2910	3050	3050	3038[a]	5.5
Mean error, per cent	4.0	5.0	5.1	3.7	4.1	3.2	4.2	4.0[b]

[a] Grand average compressive strength.

[b] Mean error (per cent) of the daily averages.

mens is very desirable in studies of this kind, since all accidental variations are permitted to exert their full effect. The effect of accidental variations is largely eliminated by making six specimens of a kind.

It will be seen that there is no systematic relation between the mean errors of the tests and the order of making. In other words, the early specimens in a set show no greater variations than the later ones; nor do the specimens made on the first day show any greater variation than those made on other days.

It will be noted, however, that the mean errors of the eight tests made on the same day are considerably lower than that of the six tests made on different days; the same statement may be made with reference to any six tests made on the same day, although the values for the latter conditions are not given. While this is true, Table IV shows that the mean errors of the average strengths of specimens made on different days are much smaller than for the average strengths of specimens made on the same day.

CONCLUSIONS.

In compression tests of concrete, the rate of application of load has an important influence on the strength. For the richer mixes (1 : 5 and 1 : 3) tested at the age of 28 days, the strength when loaded at 0.15 in. per minute is 14 to 20 per cent higher than when loaded at 0.006 in. per minute.

If part of the load is applied at a fast speed and the remainder at a slow speed, the ultimate strength of the concrete is not changed, even though as much as 88 per cent of the total load be applied at the fast speed.

Knowing the approximate strength of the specimen, it will greatly expedite the work of testing, and involve no sacrifice in accuracy, if we apply, say, 50 to 75 per cent of the ultimate load at a fast speed before changing to the slow speed.

A machine speed which gives a shortening of the test piece of 0.01 to 0.02 in. per minute per foot of length is recommended as a standard rate for compression tests of concrete.

The results show that the mean error of a group of tests made on the same day is considerably lower than that of a set of tests made on different days; while the mean error of the daily average compressive strengths is generally much higher than that of the averages of tests made on different days.

DISCUSSION.

Mr. Enright.

MR. BERNARD ENRIGHT (*presented in written form and read by the Secretary*).—The very excellent paper of Mr. Abrams draws attention to its bearing "in attempting to formulate a standard method for making compression tests," and while the reference is principally or wholly to concrete, presumably its bearing would be largely as pronounced in connection with standard mortars. This would seem to be particularly true in view of the fact that a large proportion of these tests are on mixtures of one part cement to three parts of aggregate (the standard compression mortars being one part cement to three parts standard sand) and despite the fact that the proportions are by volume, in the first case, and by weight, in the latter. Unlike the standard sand, the aggregate used might vary considerably in size, but, as Mr. Abrams says in reference to these results, "all accidental variations are permitted to exert their full effect," and the variations apparently are not great.

On the 1 : 3 mix, at the end of 28 days, the compressive strengths obtained by Mr. Abrams, as shown in Table II, range from 2840 to 3400 lb. per sq. in. It may be of interest to note, in this connection, that on 1 : 3 mix, after 28 days air and water hardening, the German Association Laboratory reports, on all the cement manufactured in Germany during the periods shown, an average compressive strength of 4984 lb. per sq. in. for 1910, 5112 lb. per sq. in. for 1911, 5368 lb. per sq. in. for 1912 and 5353 lb. per sq. in. for 1913. Their "28-day exposure to water tests" are lower than these but still far in excess of the figures obtained by Mr. Abrams.

A comparison of these results might lead to the conclusion that German cements are not only superior, but decidedly superior, to the American products. Experiments and tests made by the writer, over a great many years, to develop the facts in just such comparisons, however, show absolutely that this is not the case. It would hardly be pertinent to go into detail here on the matter, but it might be added that the subject

BRIEF FOR APPELLANTS

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA

BALDWIN-SOUTHWARK
CORPORATION
and
ROBERT F. BLANKS,
Appellants,
v.
CONWAY P. COE,
Commissioner of Patents,
Appellee.

No. 7821.

U   ED STATES
COURT OF APPEALS FOR T
DISTRICT OF COLUMBI
FILED APR 30 1941
Joseph W. Stewart
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Appeal from the District Court of the United States for the District of Columbia

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JURISDICTIONAL STATEMENT.

Suit is brought by the Baldwin-Southwark Corporation, a corporation of Pennsylvania, and Robert F. Blanks of Denver, Colorado, as plaintiffs, against Conway P. Coe, as Commissioner of Patents.

The complaint (Appellants' App. 2, par. 3) recites the filing of an application (numbered 637,298, filed October 11, 1932) for patent by the plaintiff Blanks, assignor to plaintiff Baldwin-Southwark Corporation, and the refusal of the Board of Appeals of the Patent Office by the Primary Examiner (Appellants' App. 3, par. 6) and the affirmance of such ruling by the Board of Appeals (Appellants' App. 6, par. 7), admitted by defendant (Appellants' App. 8, pars. 6 and 7).

Jurisdiction is founded upon Section 4915 of the Revised Statutes of the United States. (See appendix page 40 hereof) and upon the diversity of citizenship between the parties.

The allegations of residence and jurisdiction are found at Appellants' App. 2, par. 1 of the complaint, and paragraphs 1 and 2 of the defendant's answer (Appellants' App. 7).

STATEMENT OF THE CASE.

The Blanks application for patent No. 637,298, filed October 11, 1932, involved herein relates to a method and apparatus for applying a *predetermined rate of load change* to a specimen being tested, whether under compression, tension or other forms of stress or strain (Appellants' App. 9). The rejected claims are 1 to 9 inclusive and 19, 20, 22 and 23. (Appellants' App. pp. 14, 15, 19 and 20.) All of the claims in suit are printed in full in Appendix A.

Claims 1, 6 and 23 may be taken as typical. These claims are:

1. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate applying load to the specimen.

6. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a stress indicating hand, an auxiliary hand, means rotatably supporting said hands in superimposed axial relation, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate of applying load to the specimen.

23. The combination in an apparatus for effecting a predetermined rate of load change applied to a test specimen in a materials testing machine having opposed specimen-engaging elements one of which is moved to apply load to the specimen; comprising, a rate of load member movable at the precise predetermined rate of speed at which it is desired to apply load progressively to a specimen at each instant during a test irrespective of deformation characteristics of the specimen, means for continuously driving said member at said speed, a load indicating member movable in accordance with the actual load applied to the specimen and movable adjacent to said rate of load member in visible register therewith so long as load is actually applied to the specimen at said predetermined rate, means for actuating said load indicating member solely in accordance with the load force applied to the specimen, and adjustable means for controlling

> the application of load to the movable specimen engaging element of the testing machine whereby the operator may control the application of load force to the specimen and simultaneously observe whether said register relation is being maintained.

Of these claims, 1 and 6 were in the application as filed October 11, 1932, claims 19, 20 and 22 were added by amendment of October 26, 1932 (Appellants' App. 19) and claim 23 was added by amendment of May 12, 1938 (Appellants' App. 20). All of the claims, except 23, were formally allowed on May 24, 1934 (Appellants' App. 19). Subsequently the Blanks application was placed in interference with an application of one Lewis, the issue of interference being the same as the present claim 1 of the Blanks application.

Lewis moved to dissolve the interference, citing an obscure leaflet (Plaintiffs' Exhibit 14, Appellants' App. 47; translation, Plaintiffs' Exhibit 3, Appellants' App. 95) claimed to have been published by an Austrian manufacturer by the name of Krause, following July, 1930.

The Examiner of Interferences on July 30, 1935 (Appellants' App. 27, 29) *inter partes* denied the motion to dissolve the interference, holding that the Krause leaflet did not disclose the invention, and also that it was not proven.

The Examiner of Interferences *inter partes* on rehearing on January 6, 1936 (Appellants' App. 31), reversed himself and held that the Krause leaflet did disclose the invention of Blanks claims 1 to 9 inclusive and 19, 20 and 22.

Subsequently the adverse party was granted leave to take depositions to prove the publication of the leaflet and depositions were taken for that purpose. (Appellants' App. 38-45.)

Thereafter, on February 15, 1938, (Tr. 3) the Board of Appeals (Copied in Appellants' App. 24) *inter partes* affirmed the Examiner's ruling dissolving the interference, but did not do so upon the ground that the Krause leaflet disclosed the count, nor that it disclosed what the examiner thought it did when he reversed his former holding of insufficiency.

Thereafter the Blanks application was considered *ex parte* and on May 12, 1938 claim 23 was added in an endeavor to state the invention more accurately (Appellants' App. 24). On May 18, 1938 (Appellants' App. 20) the Examiner *ex parte* finally rejected all of the claims and in his statement upon appeal to the Board restated his objections (Appellants' App. 21).

On June 16, 1939 the Board of Appeals (Appellants' App. 24) adhered to its former ruling as to claims 1-9, 19, 20 and 22 but considered claim 23 separately (Appellants' App. 25) adding, however, (p. 27) that "an ordinary clock is not suggested" in the Krause leaflet.

> "It is believed that to place an ordinary time clock, with its hand in the manner stated in the reference, would be substantially useless and would not be as practical as listening to the beats of a metronome which had been timed to the desired speed."

This suit under Section 4915 was then brought and evidence was offered at the trial to show that the Krause leaflet is vague and that if it had any meaning at all it would relate not to predetermining the rate of load change, but to an operation entirely different, and that if the leaflet meant anything at all it meant merely placing an ordinary time clock with its hand in the manner stated in the reference, which use would not be substantially useless as thought by the Board although it would not be a use similar to that disclosed in the Blanks application.

The Court below (Appellants' App. 91) directed a dismissal of the complaint, and from that order this appeal has been taken.

The opinion of the Court (Appellants' App. 91) deals mainly with the question of whether the leaflet constitutes a publication under the statute, and does not discuss the matter of disclosure although the decision agrees with the Board of Appeals.

Appellants allege error on the part of the Court below (Appellants' App. 93):

(1) In holding that the Krause bulletin disclosed the subject matter and claims of the Blanks application.

(2) In holding that the Blanks application recites nothing patentable over the disclosure made in the Krause leaflet.

(3) In holding that the evidence in the case is sufficient to show that the Krause leaflet was a publication within the meaning of the statute. And

(4) In not granting the relief prayed for in the complaint.

STATUTES INVOLVED.

(See Appendix)

STATEMENT OF POINTS.

Appellants urge:

1. That the Krause leaflet is vague and indefinite and does not disclose the invention claimed in the Blanks application; the Board and the Court below erred in reading into the leaflet features not disclosed therein in order to hold anticipation of the Blanks invention.

2. The conclusion of the Board of Appeals to the effect that to place an ordinary time clock, with its hand in the manner stated in the reference, would be substantially useless and would not be as practical as listening to the beats of a metronome which has been timed to the

desired speed was erroneous, although such arrangement was not that of the Blanks disclosure.

3. The holding of the Board of Appeals that the Krause leaflet required a special interpretation of the meaning of the word "clock" on its face shows that the Krause disclosure is insufficient.

4. The Court below erred in not holding that the evidence submitted upon the trial of this case shows that the Krause leaflet not only does not disclose the Blanks invention, but proposes only to measure the speed of the head piece, as was common in the art, and any use of the clock was merely for convenience in noting the time of the beginning of the test, the time of reaching the yield point, and the time of reaching the breaking point.

5. That the tribunals below overlooked the settled rule of law that a foreign publication is to be measured only by what is clearly and definitely expressed in it.

6. That the evidence does not establish that the Krause leaflet was published within the meaning of the statute.

7. That the uncorroborated testimony of one witness that he sent copies of an undated leaflet to four "interested" parties and approximately one hundred copies to prospective customers, is not sufficient evidence of publication within the meaning of the statute.

Summary of Argument.

The Problem Involved.

It is essential for engineers to know the strength and elastic qualities of materials such as steel and concrete in order to design properly and safely buildings, bridges, dams, machinery, etc. In some instances life-size specimens are tested as shown in Plaintiffs' Exhibits 5*a* and 5*b* and in other instances small specimens are tested such as those marked "2207" in Plaintiffs' Exhibit 5*c*. (Appellants' App. 103-105.)

For some years prior to the application for the Blanks patent it was known that the results attained when testing various materials for tenson or compression varied substantially according to the speed of the test.(¹) Materials tested at a rapid rate will have an apparent higher strength than those tested at a slow rate (Appellants' App. 84, 114).

In an attempt to obtain uniformity of testing, various methods have been tried "one by *rate of head motion* and the other by *rate of load actually applied* to the specimen." (Q. 45, Appellants' App. 74.)

To drive the moving head of the machine at a uniform rate did not mean a uniform rate of *load.* (Qs. 11, 12, Appellants' App. 84.) If the head piece of the machine moves at a constant rate then the applied load, in order to maintain the head piece at constant speed, is variable in the different portions of the test. If, on the other hand, the rate of load application is uniformly increased, the speed of the head piece will vary during the different portions of the test.

No Previous Satisfactory Means.

There was no means known by which the test load could be conveniently applied at a uniform rate (Appellants' App. 78, 79, 80 and 84). In one make-shift attempt

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(¹) Professor Martens in 1899 pointed out (Appellants' App. 155): "The question of effect of rapidity of production of deformation on results of tests has been repeatedly touched upon, that is, on the value of stress and the proportional limit, yield point, and maximum load, or upon the value of elongation and contraction. *This question is of course of the greatest practical importance in testing machines.*"

See also Encyclopaedia Britannica of 1888 (Appellants' App. 114), Abrams' testimony (Appellants' App. 84) and Goldbeck's testimony (Appellants' App. 78).

to accomplish uniform rate of load application it was customary for the operator to listen to the beats of a metronome and apply his load as nearly as he could in accordance with the timing of the metronome beats (Appellants' App. 10, 80), or in some special cases to use buckshot machines (Ex. 13, Appellants' App. 143, 78, 79). It was also common in connection with testing by speed of head motion to employ a screw type (Ex. 10, Appellants' App. 129, 79, 80) or an Amsler type (Ex. 11, Appellants' App. 137) of machine and to observe a clock or watch and note the time or speed from starting the test to the time the test material reached its yield point and the time at which the specimen broke (Plaintiffs' Exhibit 15, last column, Appellants' App. 155 and 85).

These methods involved more or less calculation and difficulty and were not complete.(2) This is so for the reason that different materials exhibit different characteristics under tension or compression. For instance, steel has elastic qualities the same as rubber. It stretches or compresses under application of load and upon release of that load the material will snap back to its original length. However, when the material reaches what is known as its elastic limit or "yield point", then the material acquires what is known as a permanent set and will only partially snap back to its original length upon release of the load. From this point on until the metal finally ruptures or "breaks" the material continues to stretch, but the load

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(2) *As to the metronome* Emery testified (Appellants' App. 70), "Well, it is very difficult. It is not very easy to coordinate with your eye and ear and hand. You have got to make mental calculations all the time, to know whether you are doing what you want to do; and you will get mixed up and lost and you will become very much lost. It is not a continuous operating device. Furthermore, you have got to figure out, to begin with, what you want for your time interval and what you want for your load interval."

Goldbeck testified (Appellants' App. 81), "Well, the operator would endeavor to make his four seconds coincide with the motion of the hand across the main division of the dial, but he had quite a time of it. He was not at all successful. At times his hand would arrive at the main divisions before the four seconds were up, indicating that it was applying the load at too rapid a rate. And so then he would slow it down, but he would have to wait until the next four beats were up before he could find out how successful he was. So we had a great deal of difficulty in applying the load at the desired rate."

As to the buckshot machine. See Goldbeck, (Appellants' App. 78, 79).

As to the speed of head motion, Emery testified (Appellants' App. 67) "The speed of the head is supposed to be kept uniform but, as a matter of fact, as I have stated, from all these deformations of the machine and stretching of the parts and slipping of the grips, the actual effect is not uniform."

Goldbeck testified (Appellants' App. 80), "As Mr. Emery has very nicely pointed out, the fact that you run that head at a constant rate of speed when the machine is unloaded does not at all mean that you are applying load at a constant rate of speed to the specimen, for several reasons—the elastic deformation of the specimen itself varies, depending upon the elastic properties of the specimen; the elastic deformation of the machine controls the rate of loading."

And Abrams' paper (Plaintiffs' Exhibit 19, Appellants' App. 166) states, "It should be noted that the rate of loading is not the same as the rate of movment of the machine head when running idle; the idle speed may be 2 to 4 times as fast as the speed under load, due to the deflection of the levers, elongation of screws, compression of cushions, etc."

As to the time watch, Abrams testified (Appellants' App. 85), "That, however, it should be made clear, did not enable us to apply the load at a predetermined rate. We simply determined what the rate was and that was accomplished in a very laborious fashion by dismantling the machine and putting various sizes of pulleys and belts to operate the machine."

pressure required to continue the stretching during this period is less than that prior to or at the "yield" point. (See curves showing these relations in Plaintiffs' Exhibit 15, Appellants' App. 152, 153.)

Because of the difficulty of applying the test load at a constant rate the art for many years prior to the Blanks application operated the machines so that the head piece thereof attempted to move at a uniform rate of speed. This was done notwithstanding the art recognized that such a test involved a certain amount of error owing to the stretch of the machine, slippage of gripping devices, etc.; such tests were accepted because of the lack of convenient and accurate means for measuring the rate of load application.(1)

The Blanks Solution

Blanks in his application proposed to provide a usual pressure (i.e., load) (Appellants' App. 63) indicating hand 3 and another independent "load-rate" hand 13, which latter hand is caused to rotate at the predetermined rate desired for the load application. For convenience a copy of Fig. 2 of the Blanks drawing is inserted.

Thereby the operator by manipulating the usual valve controlling the admission of fluid to the hydraulic loading cylinder could easily cause the load indicating hand to move in registry with the time indicating hand, whereby the rate of load application would be precisely the same as that of the predetermined timing hand (Appellants' App.

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(1) Abrams testified (Appellants' App. 84, 85) Q. 14 " * * * but we had no way of controlling the rate of load in any case." Q. 15 "Those tests, then, would mean that you would recognize that there would be some error in the individual tests". A. "Yes, there would be error in the individual tests". Q. 16 "Was there any known way of overcoming it?" A. "No sir, there was no known way of overcoming it at that time."

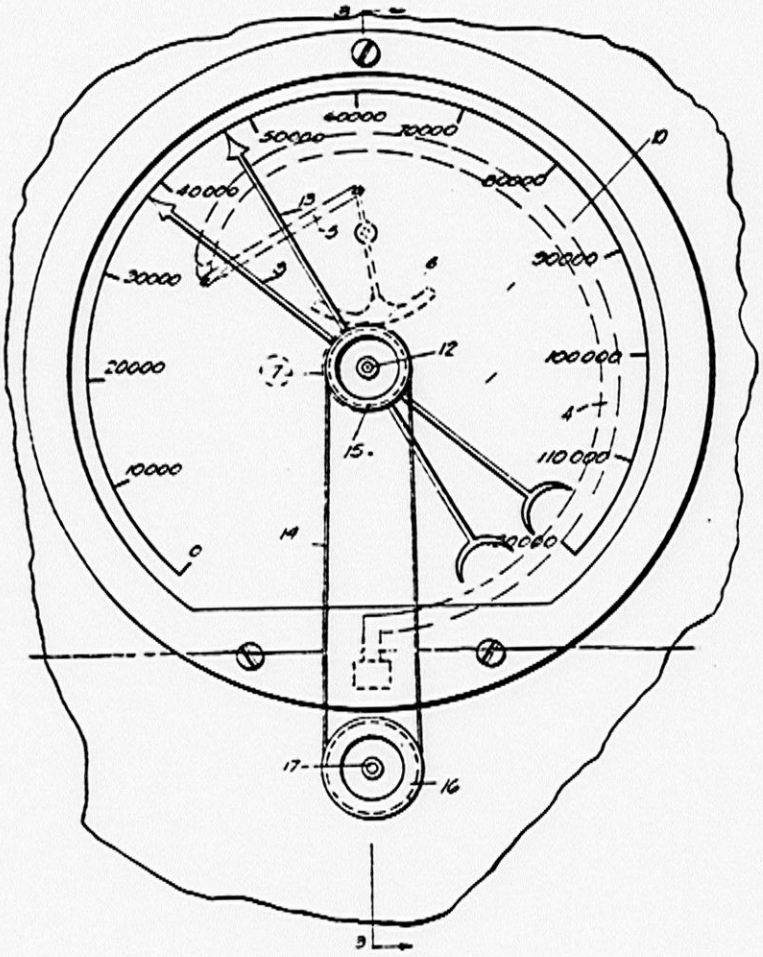


Fig. 2

11, 21). This enabled the operator always throughout the entire test to check the application of load to the specimen at the precise rate prescribed (Finding of Fact No. 2, Appellants' App. 91).

The Krause Leaflet.

The machine shown in all of the figures of the Krause leaflet is a type known as the Amsler machine and is shown in Plaintiffs' Exhibit 11, (Appellants' App. 137).

In its Fig. 1 it shows a commonly used indicating dial having two concentric scale readings and two concentric needles, one for each scale.

It was common practice in testing with these machines to apply the load in such manner as to cause the head piece marked 2 in Exhibit 14 (Appellants' App. 145) to move at a uniform rate (Qs. 37, 40, 41, Appellants' App. 73). To this end the Amsler people patented and sold a valve (shown in Plaintiffs' Exhibit 12, Appellants' App. 140) which automatically insured constant speed of the head piece (Appellants' App. 67 and 140, lines 28, 29). This valve was pointed out in Fig. 1 of the Krause leaflet by Mr. Emery (Plaintiffs' Exhibit 14, Appellants' App. 145, 73, 74) and marked 1 by him.

The reference to the use of a clock in the paragraph of the Krause leaflet gives no information as to the special kind of clock intended, and does not indicate that there is any intention of doing anything more than following the common practice of ascertaining or measuring the elapsed time or speed of the head piece between the beginning of the test and the yield point and the time of fracture. This common practice is referred to in Plaintiffs' Exhibit 15, Transactions of the American Society for Testing Materials, (Appellants' App. 149; see page 13, Appellants' App. 155) where it is stated:

> "The time which elapses between yield strength and fracture may be measured by means of a watch, using a speed of head which, it is estimated, gives approximately the desired rate of strain."

Abrams also points out (Appellants' App. 85) that in his use of a watch

> "That, however, it should be made clear, did not enable us to apply the load at a predetermined rate. We simply determined what the rate was and that was accomplished in a very laborious fashion by dismantling the machine and putting various sizes of pulleys and belts to operate the machine."

In other words, Abrams employed a watch for determing or measuring what the rate or speed of the head was and then was only able to accomplish an adjustment of that speed in "a very laborious fashion by dismantling the machine". This again had reference only to rate of head motion and not to rate of load (Qs. 11 and 13, Appellants' App. 84). It is Blanks' position that Krause, like Abrams and Plaintiffs' Exhibit 15, merely used a clock or watch for ascertaining what the rate or speed of the head was and then to obtain a given rate of head speed employed auxiliary means such as the Amsler control valve.

The use of the watch or clock in the foregoing manners is the exact opposite of the Blanks disclosure of having a pacer hand which could be followed by the operator during each instant throughout the test in applying the load at a predetermined rate, "irrespective of the deformation or strain characteristics of the material under test." (Blanks' application, Appellants' App. 13.)

ARGUMENT.

1. The Krause Leaflet Does Not Anticipate the Blanks Invention.

A. Blanks Inventive Idea.

The inventive idea of Blanks was to depart from the fixed practice of applying a uniform rate of speed to the head piece and instead make it convenient to test under *actual* rate of load application. To carry out this idea he employed the simple means of the independent pacer hand with which it would be easy for the operator to cause the load indicating hand to move in register, this being particularly defined in claim 23.

B. The Krause Leaflet Is Vague and Does Not Suggest Controlling the Rate of Load Application.

The Krause leaflet does not mention or even suggest predetermined *load* application.

It shows no means for attaining predetermined *load* application.

Nor is there any drawing showing a *pacer* hand. There is no illustration showing the clock or how it is mounted.

One is left entirely to speculation as to what the text means.

The text is vague and only one obscure paragraph is referred to by the Patent Office as anticipatory of Blanks, i.e., the paragraph reading (Appellants' App. 96):

> "For measuring of a desired testing speed (in accordance with acceptance regulations of the German Railroad), a time clock is used which is built into the pendulum scale. The hand of the clock is arranged concentric with the hands of the scale."

This paragraph has been given three different interpretations by the two Patent Office tribunals, a circumstance which in itself shows that the meaning of the paragraph is not clear.

The last interpretation, that of the Board of Appeals, as will be shown hereinafter, substantially admits that the Krause leaflet does not disclose the Blanks invention.

The Patent Office Decisions Differ in Their Understanding of What Is Disclosed by the Krause Leaflet.

The Primary Examiner (*inter partes*) on July 30, 1935 (Appellants' App. 27) first held that the Krause leaflet did *not* disclose the invention of the issue (claim 1). Then on January 6, 1936 (Appellants' App. 31) (*inter partes*) he reversed himself and held that it *did*. The Board of Appeals, *inter partes*, on February 15, 1938 (recopied at Appellants' App. 24) although affirming the examiner did not adopt his interpretation of the Krause leaflet but held that if the description is "generic to various clock arrangements *which would not satisfy the count*" (italics by counsel) it would be obvious to employ "a clock in which the pointer moves in the same direction as the pointer of the testing machine and over substantially the same path" an assumed arrangement which obviously has no relation to rate of load application and is foreign to the Blanks inventions.

Up to this point the decisions were *inter partes* and related only to claim 1.

Then on May 18, 1938 (Appellants' App. 20) *ex parte* the Examiner dealing with all of the claims in issue finally rejected the application, and on December 10, 1938 (Appellants' App. 20) filed his statement on appeal. On June 16, 1939 (Appellants' App. 24) the Board recopied its former decision as to claims 1-9, 19, 20 and 22, and affirmed the Examiner as to those claims and also claim 23.

(a) The Primary Examiner (acting as the Examiner of Interferences) in holding that the Krause leaflet failed to disclose the Blanks' invention (Appellants' App. 28) pointed out that

> "The clock mechanism is not shown, leaving it uncertain whether the clock is a spring driven type, or whether the electric motor shown just below the dial drives the recorder chart and the 'clock' hand. It should be noted also that the hands are somewhat widely spaced."

And further (p. 30):

> "The essential novelty of the count comprises the concept of applying a *force* in a test by keeping a *force* hand substantially registered with a pacer (*time*) hand. Now the two hands in the prospectus are shown so far apart as to negative the contiguous relation and pacing concept above referred to. *At best the prospectus may be said to include a clock, but not in the relation to the force hand covered by the count—rather it is related to the force hand as was the metronome or stop watch of earlier practice.*" (Italics by counsel.)

As here pointed out by the Examiner, the hands of the Krause bulletin are far apart, thus not even suggesting any relationship between the hands, whereas in the Blanks application the hands are not only shown as close together as they can be consistent with showing both hands, but the specification expressly describes their relationship as being in "synchronism" (Appellant's App. 11) with each other, "the ideal position being immediately below hand 13 at all times during application of load." (Appellant's App. 13.)

(b) In his decision reversing himself (Appellants' App. 31) the Examiner pleads that when writing his first decision he (Appellants' App. 32) "was ignorant of the details of the particular type of dynamometer disclosed by the Krause leaflet" and also "as to what part actually was the pendulum". He then resorted to the expedient of visiting the Bureau of Standards and examining some apparatus there and also (p. 33) examining Batson and Hyde's treatise on "Mechanical Testing", thus showing that he could not reverse his decision upon the disclosure of the Krause leaflet alone, but was forced to resort to other references and speculation, asking himself the following question "What is its purpose?" In answering himself he erroneously stated "The leaflet states it is 'to regulate testing speed', *in other words, a pacer hand*" (italics by counsel). The Krause leafiet makes no reference to a pacer hand. The Examiner thus by his own action demonstrated that the disclosure of the Krause leaflet is not *of itself* sufficient.

The Examiner further deemed that his observation that the two hands were separated was erroneous because he thought that "The attendant has simply stepped back to show the entire apparatus, and the *pacer hand has advanced normally* (italics by counsel), while the force hand is stationary because the attendant has released the force applying the hand valve." Obviously the two hands were still separated, the same as before without any suggestion of either one being a "pacer" hand, even after the attendant had stepped back. And, moreover, here for the first time the Examiner jumps to the conclusion that one of the hands is a *pacer* hand. This assumption was pure imagination, without any support in the Krause bulletin.

The *normal* indication given by the two hands of Fig. 1 is clearly shown by the text and the two scale markings on the dial. The text, page 3, shows that in some machines, Fig. 7 for example, the "Maximum Loading—40,000 Kg." referred to in heavy type on page 1 is divided into three test ranges, i.e., 0-4,000 Kg., 0-12,000 Kg., and 0-40,000 Kg., and in some types, Fig. 1 for example, the scale is divided into two concentric scales, one of 10,000 Kg., and another of 40,000 Kg. In Fig. 1 is illustrated two concentric scales with one indicating needle for each scale, and the needles so far apart from each other that no one would suppose any relationship between the needles, much less a relationship such as one hand serving as a *pacer* for the other hand, a relationship which would require the needles to be kept close together. Certainly this is so in view of the total absence of anything in the text stating anything suggesting a pacer relationship, and in view of the presence of language in the text pointing out, and Fig. 1 showing, the commonly used divided scale with two needles independent of each other and each reading over its own division of the scale.

Furthermore, if one had started to speculate about the two hands, and sought for an explanation in disregard of the statements in the text, and the plain showing in the drawing, his next supposition would have been that if both hands were to read over the same scale, one of the hands would be a *maximum load* hand, i.e., a hand moving to the point of maximum load and there remaining when the load hand is returned to its normal position. This maximum load hand was commonly used, and Fig. 1 would be far more likely to be understood as showing "the attendant has stepped back" at the end of a test in which the load hand has returned to zero ("because the attendant has released the force applying hand valve") and the *maximum load* hand has remained to indicate the maximum load applied in the test.

This maximum load hand does not indicate any rate but is simply like a recording thermometer that indicates maximum and minimum temperatures (Appellants' App. 63). A maximum load hand such as meets the appearance of Krause's Fig. 1 is described in Southwark-Emery Bulletin Plaintiff's Exhibit 18 (Appellants' App. 163) as follows:

> "A fine red idler hand running on a spindle held in watch-jewel bearings is carried along by the black pointer to mark the maximum load values. After the black pointer has deposited the red hand, it will fall away to the fracture point, thence back to zero."

Also Plaintiffs' Exhibit 17 Amsler testing machine catalog (Appellants' App. 160) states:

> "A loose pointer, engaged by the indicating pointer as it rises, remains in the highest position reached, whilst the fixed pointer returns to zero and it thus indicates the maximum load attained."

The Krause machine is of the Amsler type (Appellants' App. 73, 74) and therefore provides every reasonable basis for saying that one hand of Krause is a load indicating hand and the other a maximum load hand exactly as above described by Amsler.

And furthermore the Krause paragraph in question (Appellants' App. 96) refers to "hands" (plural) of the "scale", apparently meaning one hand for each scale marking. Now if Fig. 1 also has a clock hand in addition to the "hands", then Fig. 1 should show three hands, but only two are shown.

(c) The Board of Appeals in its first decision (*inter partes*) (Quoted in Appellants' App. 24) had little to say in the way of analyzing the statement in the Krause leaflet, but did say (Appellants' App. 24, 25):

> "even if that publication may be generic to various clock arrangements *which would not satisfy the count*"

nevertheless

> "the employment of a clock in which the pointer moves in the same direction as the pointer of the testing machine and over substantially the same path would be an obvious, and probably the most obvious, one."

These cryptic statements at least imply that the Board considered the meaning of the leaflet uncertain as to any specific clock arrangement, and furthermore, and of more importance, the last quoted paragraph shows that the Board had overlooked entirely the nature of the Blanks invention, which is not merely moving two pointers in the same direction and over the same path, but consisted in employing a *pacer* hand, moving at a *predetermined rate of load application,* a load hand registering therewith. As stated by the Examiner (Appellants' App. 30):

> "The essential novelty of the count comprises the concept of applying a *force* in a test by keeping a *force* hand substantially registered with a pacer (*time*) hand."

This fundamental inventive idea was disclosed only by Blanks, and it was only after Blanks' disclosure thereof that the tribunals below were able to *imagine* that the Krause structure might with alteration be made to carry out the Blanks concept.

(d) The examiner's *ex parte* statement of December 10, 1938 (with respect to all the claims in issue) on appeal to the Board, starts (Appellants' App. 22) by repeating his imaginary statement that one of the hands (apparently referring to Fig. 1) is a *pacer* hand, and added another imagination to the effect that the pacer "is driven by an adjustable clock mechanism," something not shown or mentioned in the Krause leaflet, and stated by the examiner on the alleged authority of an affidavit of one Fritz Tengg, not called as a witness. The very citation of the affidavit again demonstrates that the examiner could not find a clear disclosure in the Krause leaflet itself, but had to supplement it with other disclosures, and even then found nothing that singly or collectively disclosed the Blanks' inventive concept.

(e) In its final decision of June 16, 1939 (*ex parte*) the Board repeats its former decision with respect to claims 1 to 9, 19, 20 and 22, but with respect to claim 23 (Appellants' App. 25, 26), admits:

> "A question therefore arises as to what interpretation shall be given to the term 'clock' in the reference"

and finally holds:

> "It is believed that to place an ordinary time clock, with its hand in the manner stated in the reference, would be substantially useless and would not be as practical as listening to the beats of a metronome which had been timed to the desired speed. We consider, therefore, that the reference is pertinent even as to claim 23."

Thus the Board finally takes the position that when the leaflet speaks of employing a "time clock" that an ordinary clock is not meant because that would be "useless" and therefore unreasonable, but that instead a special clock was intended having some relation to the manner in which a metronome had theretofore been used in the prior art.

The new evidence submitted in the court below shows that an ordinary clock is a very useful thing in connection with speed of head motion and therefore there is just as much reason, if not more so, to say that the reference in the leaflet to "a time clock" means precisely that and nothing more; in other words, an ordinary clock such as was used by Abrams and referred to in Plaintiffs' Exhibits 15 and 16 (Appellants' App. 149 and 157). Moreover the Board here admits that it must resort to the prior art in an attempt to guess what the term "clock" may mean.

Even the speculative disclosure assumed by the Board would be far from the Blanks inventive concept. Merely placing a clock with its hands concentric with the hands already on the indicator would not indicate anything more than making it convenient for the operator to note the time of starting, the time of reaching the yield point and the time of ending the test at the breaking point.

Blanks' Device Answers Long Known Want

The problem of rate of load application has been long known since at least 1888 (Plaintiffs' Exhibits 8 and 9, Appellants' App. 114, 115) and has been continuously struggled with by many but without success, as shown by the efforts of outstanding individuals such as Goldbeck, Abrams, Jones and Moore and by reputable manufacturers such as Amsler and Olsen (Plaintiffs' Exhibits 12 and 13, Appellants' App. 139, 143). The deficiencies and difficulties of these various attempts were widely known (footnote 2, page 8 of this brief). The evidence shows that Blanks' device is a successful answer to the problem and that it has been widely accepted. Such facts are cogent evidence of invention and this court in *Wach* v. *Coe*, 77 Fed. (2d) 113, 115 quoted with approval the Supreme Court's pronouncement that

> "Where the method or device satisfied an old and recognized want, invention is to be inferred, rather than the exercise of mechanical skill. For mere skill of the art would normally have been called into action by the generally known want." Paramount Publix Corp. v. American Ergon Corp. 292 U. S. 464.

2. Error of the Tribunals Below.

1. The tribunals below should have applied the rule that a foreign publication must speak for itself and not have implied into it anything more than what is clearly disclosed therein, and in a case such as in the case at bar where two tribunals arrive at three different conclusions, it should be taken as convincing evidence that the disclosure of the Krause leaflet was not clear.

It is well settled that mere vague and general representations in a foreign publication will not support the defenses of anticipation.

As far back as *Seymour* v. *Osborne,* 11 Wallace 516, 555, the Supreme Court, speaking with reference to a British mechanism, said:

> "Mere vague and general representations will not support such a defense * * *".

This Court has consistently applied this rule. As stated *In re Ek,* 57 App. D. C. 203, 19 Fed. (2d) 677:

> "* * * a foreign patent is to be measured as anticipatory, not by what might have been made out of it, but by what is clearly and definitely expressed in it."

Davies v. *Coe,* 65 App. D. C. 345, 83 Fed. (2d) 603.

Kelley v. *Coe,* 69 App. D. C. 202, 99 Fed. (2d) 435, 442, footnote 11.

Becket v. *Coe,* 69 App. D. C. 53, 98 Fed. (2d) 332, 335, in which this Court remarked:

> "But when such a patent merely prophesies what can be done without setting forth that it has been done, or makes claims for things not fairly disclosed in the specification, the foreign patent does not anticipate. Westinghouse Air-Brake Co. v. Great Northern Ry. Co., 2 Cir., 1898, 88 F. 258; General Electric Co. v. Hoskins Mfg. Co., 7 Cir.,

> 1915, 224 F. 464; Haynes Stellite Co. v. Chesterfield, supra; American Stainless Steel Co. v. Ludlum Steel Co., 2 Cir., 1923, 290 F. 103. This court has said, in Davies v. Coe, 1936, 65 App. D. C., 345, 346, 83 F. 2d 602, 603:
>
> 'The disclosure of a foreign patent is to be measured not by what may be made out of it, but what is clearly and definitely expressed in it. In re Ek, 57 App. D. C., 203, 19 F. (2d) 677; Carson v. American Smelting & Refining Co. (C.C.A.) 4 F. (2d) 463.' "

It is also well settled that any publication of this character capable of several interpretations is not to be taken as a clear disclosure of any one of such interpretations.

Cimiotti Unhairing Co. v. *Comstock Unhairing Co.*, 115 Fed. 524 (C.C. S.D. N.Y.):

> "It is enough that it is impossible to formulate any definite explanation of the working of the Lake machine. A document so obscure in its terminology that two conflicting theories may be deduced therefrom and supported by equally plausible arguments is too indefinite to be utilized as an anticipation. Tilgham v. Proctor, 102 U. S. 707, 26 L. Ed. 279; Topliff v. Topliff, 145 U. S. 156, 12 Sup. Ct. 825, 36 L. Ed. 658; Cohn v. Corset Co., 93 U. S. 366, 370, 23 L. Ed. 907; Brill v. Railroad Co. (C.C.) 103 Fed. 289."

Carson v. *American Smelting & Refining Co.*, (C.C.A. 9th Circ.) 4 Fed. (2d) 463, 465, and cases cited.

2. The opinions of the tribunals below have assumed that it would be easy to change the conventional parts, such as the clock, suggested by Krause, and assemble them to carry out the Blanks idea. But this assumption is made *after* the Blanks disclosure. Even assuming that *if* Blanks had stated that his object was to apply the load at a predetermined rate, and to do so by the use of a

pacer hand, it would have been within the skill of the art to adapt and arrange the suggested parts of Krause in such a way as to carry out the objective, that would not anticipate, for it is well settled that as stated by Judge Learned Hand in *Sachs* v. *Hartford Electric Supply Co.*, 47 Fed. (2d) 743, 745:

> "However, we cannot judge an invention by the ease with which the prior art may be changed, once the idea is conceived."

Or, as stated in the more recent case of *Patent Royalties Corp.* v. *Land O'Lakes Creameries,* 89 Fed. (2d) 624, 627 (C. C. A. 2d Cir.):

> "True, the difference between it and the patent was structurally slight, but such differences count *when a new conception is necessary to bridge them;* nobody would be led to do so by Odell. Traitel Marble Co. *v.* U. T. Hungerford Brass & Copper Co., 18 F. (2d) 66, 68 (C. C. A. 2); Regar & Sons *v.* Scott & Williams, 63 F. (2d) 229, 231 (C. C. A. 2)." (Italics by counsel.)

So in the case at bar there is no suggestion in Krause of the inventive idea of Blanks.

All of the opinions are based upon imagination after the event, and after Blanks' invention had been submitted to and analyzed by them. It was only after that that they could imagine that the clock was for *rate of load application,* and that one of the hands in Fig. 1 was a *pacer* hand and that this imaginary hand would be held in registry with the load hand.

3. The New Evidence.

To these three interpretations of the leaflet may be added a fourth, as shown by plaintiff in its proof before the Court below, i.e., that the leaflet merely discloses the old Amsler type of machine in which there is no rate of load control but only rate of head piece control, and that an ordinary clock may be employed to time the speed of the test from start to the yield point and to the point of fracture.

In the case at bar it is shown that the common practice in testing was to impart a uniform rate of motion to the head piece of the machine.

Examples of this practice are shown in

> Olsen patent 445,476 (Plaintiffs' Exhibit 10, Appellants' App. 121).
>
> Amsler Machine (Plaintiffs' Exhibit 11, Appellants' App. 136).

The latter machine is the same type as that shown in the Krause leaflet. (Findings of Fact, par. 3. Appellants' App. 92.)

The testimony of Emery (Appellants' App. 68) shows that these Amsler machines were controlled entirely by the rate of head motion. Indeed Amsler in his patent 1,467,552 (Plaintiffs' Exhibit 12, Appellants' App. 139) shows a control valve for automatically controlling the piston of the press (and hence the head piece of the machine) to cause it to move "always at the same speed." (Appellants' App. 140, line 29.) This same valve is indicated in Fig. 1 of the Krause leaflet. See testimony of Emery (Appellants' App. 73, Q. 37; 74, Q. 45) and Plaintiffs' Exhibit 14 where Emery drew a ring around the valve and marked it 1.

For convenience we insert a folder showing the three machines here referred to and the automatic valve used in the Amsler type machine. (Appendix C.)

One skilled in the art at the time of the Krause leaflet, therefore, would have recognized the machine therein described with its automatic valve to be one in which uniform speed of *head piece* would be maintained, and unless his attention was expressly called thereto would have had no reason even to think of rate of *load* application.

Moreover, not only was the Board of Appeals in error in assuming that the use of an ordinary clock would be useless, but in fact the evidence in this case shows that they were useful for the *very purpose of measuring the testing speed* such as from the beginning of the test to yield point and to the breaking point.

The testimony of Abrams shows that as far back as 1917 it was the practice to use a watch in this manner for measuring the speed of the head piece. (Appellants' App. 85.)

This testimony of Abrams is confirmed by the paper of Jones and Moore in the Transactions of the American Society for Testing Materials (Plaintiffs' Exhibit 15, Appellants' App. 149, 155) which states:

> "The time which elapses between yield strength and fracture may be measured by means of a watch, using a speed of head which, it is estimated, gives approximately the desired rate of strain."

This is precisely the interpretation which Blanks urges is disclosed in Krause, namely, speed of head and a watch or clock, and yet as Abrams points out (Appellants' App. 85) "That, however, it should be made clear, did not enable us to apply the load at a predetermined rate."

The testimony of two eminent and disinterested men both skilled in the art testify to the lack of any satisfactory way of measuring the rate of load application prior to the Blanks application for patent. Duff A. Abrams (Appellants' App. 82), with long experience and having held numerous important positions, testified that he has been a member of the American Society for Testing Materials and a member of their technical committees for twenty-five years. Mr. Abrams published in the Proceedings of the Society a report on the effect of rate of load on the compressive strength of concrete (Appellants' App. 83). At that time it was realized that the rate of load application was an important factor (ib. 84), but the only method they could use was to drive the *moving head of the machine* at a uniform rate, although it did not apply uniform rate of load to the specimen (ib. 84). As he says, "We simply took what we got and ascertained what the effect was" (ib. 84), although they recognized that there would be some error but knew of no way of overcoming it (ib. 85).

Mr. Abrams had not made use of the metronome; he had used a stop watch, but that did not enable them to apply the load at a predetermined rate (ib. 85). The Baldwin-Southwark machine with the Blanks rate of load had however solved the troubles perfectly in Mr. Abrams' opinion (ib. 85).

Albert T. Goldbeck, another man prominent in the industry, and at present director of the National Crushed Stone Association (Appellants' App. 77), testified that machines operating to test by rate of head piece movement resulted in error (ib. 80); that he had had occasion to use the metronome method (ib. 80); that it was recognized that that method introduced error (ib. 81), and that the Baldwin-Southwark machines with the Blanks invention avoided the troubles and errors to which the metronome was subject.

Francis G. Tatnall, in charge of sales for the Baldwin-Southwark Division of the Baldwin Locomotive Works (Appellants' App. 86), testified that since the filing of the Blanks application "with us there has been a continually greater number sold with loading controls on them as the years went on. It started out very slowly in 1934 and picked up gradually up to the present year, whereby, I should say at the present time, now practically all the machines carry loading control on them." In fact in certain special fields, such as cement, concrete, asphalt and building materials "I would say practically every machine sold for use in that field has carried a load control, practically every machine. It has been practically universally adopted", meaning all machines of the Baldwin-Southwark

Corporation, (Appellants' App. 87). The number of machines runs into the hundreds (Appellants' App. 86).

In view of the record as it now stands we submit that Krause does not anticipate or even suggest the Blanks invention.

The machine shown was an Amsler type machine with which it was common to time the *head piece* motion, and was even provided with an automatic valve to insure uniformity of head piece motion.

Nothing in the Krause text even suggests governing the rate of *load* application. Fig. 1 clearly shows two concentric scales each having its own range and two independent needles, one for each scale range. Nothing in the text indicates that anything but an ordinary time clock will be used, the hand or hands of which shall be concentric with "the hands of the scale", thus again emphasizing that there are two hands, one for each scale.

Nothing is said about any of the hands of the clock being a pacer for anything nor even that the hands of the clock should be in close relationship with the hands of the scales. If one hand was intended it could not have been in close relationship with both hands of the scale because each hand worked independently on its own scale. On the contrary, the very illustration in Fig. 1 shows that one hand is at zero while the other is working upon the upper part of the scale.

If the figure and text are given the ordinary meaning it would merely mean that the operator is working one hand in the upper part of the scale.

Even if, as the Patent Office Examiner suggested, "the attendant has simply stepped back to show the entire apparatus," his natural assumption would be that the test is being measured by the hand in the upper scale. The only other possible interpretation would be that the hand shown as reading in the upper scale is a commonly used *"maximum load"* hand and that the operator has concluded his test, leaving the maximum load hand in the position to indicate the maximum test load used in the test.

Nowhere does the text suggest the Blanks inventive concept of a pacer hand kept in close relationship with a load hand so that the load hand could easily be kept moving at the prescribed rate established by the pacer hand. On the contrary, the hands of the Krause leaflet are shown far apart, and there is no indication that the machine is to be used in any way than in the normal commonly used way of timing the head piece motion from the beginning of the test to the yield point, and from the yield point to the breaking point.

4. The Krause Leaflet is Not a Publication Within the Law.

Four witnesses were examined. One of these (Gadolla), in the employ of the Graz Railroad Car and Machine Factory, testified that he first saw Exhibit A (the Krause leaflet) prior to October 11, 1930 and fixes the time because his concern ordered a machine on July 25, 1929, which machine was received in September 1929. He produced an invoice for the machine (Appellants' App. 51). Thus Gadolla's testimony is merely that he saw the leaflet in connection with a machine which his concern purchased in September 1929.

Two witnesses, Nitsch and Gosch, both connected with the "Elin" Aktiengesellschaft fur Elektrische Industrie, were handed "a printed circular" and both said it was received by their concern. Both said they first saw it in January or February 1930 and that it was prior to October 11, 1930 because a machine was delivered to them at the end of April 1930. Neither witness stated any fact tending to show that the leaflet was published or accessible to the public.

The fourth witness Pleger connected with Krause & Company recognized the Exhibit A and stated that it was prepared and printed in the first half of 1930. In proof of this he referred to an invoice from the printer dated July 15, 1930, and said that "a large portion thereof" was sent to "interested parties" in the months following July 1930 and gave "the names of four customers to whom this circular Exhibit A was sent", naming four concerns to whom the circular was sent, and also said that about one hundred copies were sent to "prospective customers". Pleger therefore is the only witness who stated any fact tending to show whether or not the leaflet was in fact published, and his testimony only said that it was sent to *interested* parties, who in fact were customers or prospective customers.

Thus the only testimony even *tending* to show public distribution is that of one witness, Pleger, whose testimony is *without corroboration* except to the extent that *two* copies were sent out, one to the Graz Railroad Car and Machine Factory and the other to the Elin Aktiengesellschaft fur Elektrische Industrie. The general statements of Pleger that copies were sent to two other concerns, to "interested parties" and about one hundred "prospective customers" are entirely uncorroborated and rest solely upon the recollection of Pleger given after some seven or eight years.

The testimony of Gadolla, Nitsch and Gosch may be disregarded because they say nothing showing that the leaflet was distributed to the public. The testimony of Nitsch and Gosch is uncorroborated. Furthermore, the leaflet itself bears no date. The only witness in position to know the date would be Pleger who referred to the printer's invoice. He gave July 15, 1930 as the date of printing which is subsequent to the time when it was identified by Gadolla as seen by him in the winter of 1929 (Appellants' App. 40) and by Nitsch and Gosch who say they saw it in January or February 1930 (Appellants App. 41). *Thus Gadolla, Nitsch and Gosch claim to have seen the leaflet before it was even printed.*

Furthermore, Nitsch and Gosch each, when asked to produce the actual copy of the circular corresponding to Exhibit A which they saw, produced a leaflet bearing the number "Do. 72" near the upper right hand corner of the exhibit (Nitsch Appellants' App. 41, Q. 2, Exhibit G, p. 57; Gosch Appellants' App. 42, Exhibit G), whereas the actual Exhibit A which these witnesses were supposed to identify is identified as "Do. 82". There is no explanation of this discrepancy.

The Board admits that (Appellants' App. 25)

> "* * * inasmuch as the publications have different numbers on them, it is clear they are not the same."

But they dismissed the matter by saying:

> "We *believe* that the apparent discrepancy is one which could be explained * * *."

This unexplained discrepancy shows that the testimony of Gadolla, Nitsch and Gosch is not accurate and differs from that of Pleger. It also indicates that even with respect to the matter of whether the leaflet was published, the Board was forced to rely upon imagination rather than upon testimony.

From the beginning of our patent system until at least 1923 it was well settled that a "printed publication" within the meaning of our law applied to regularly printed periodicals, magazines, books, and the like such as are open to all the public and usually of the type found in libraries where they are accessible to the public. Even trade publications such as trade catalogues were rejected. Even after 1923 some courts adhered to this rule.

The decisions referred to are:

> *Reeves* v. *Keystone Co.,* Federal Case 11,660 (1872).
>
> *Parsons* v. *Colgate,* 15 Fed. 600 (1882).
>
> *Cottier* v. *Simpson,* 20 Fed. 906 (1884).

New Process Fermentation v. *Koch,* 21 Fed. 580 (1884).

Britton v. *White Mfg. Co.,* 61 Fed. 93 (1894).

Union Tool Co. v. *Wilson & Work,* 237 Fed. 837 (1916).

M & B Mfg. Co. v. *Munk,* 6 Fed. Supp. 203 (1934).

A. H. Heisey v. *Imperial Glass Co.,* S. D. Ohio, Judge Sater; unreported.

In 1923 in the case last cited, upon appeal to the Circuit Court of Appeals for the Sixth Circuit, *Imperial Glass Co.* v. *A. H. Heisey & Co.,* 294 Fed. 267, in a case where it held that the evidence in the case was enough to indicate due publication, the Court also overruled the above cases of *Britton* v. *White, Reeves* v. *Keystone, Parsons* v. *Colgate and Fermentation Co.* v. *Koch,* upon the ground that:

> "* * * manufacturer's catalogues so circulated are more effective in spreading information among persons skilled in that art than if the same catalogues were only on file in some public library."

And that the above cases arose under the Act of 1836 which

> "* * * merely holds that the publication of a manufacturer's catalogue, which is not found in a library, must be proved by some evidence other than the imprint."

The Court also overruled the above cases on the ground that these cases depend upon *Reeves* v. *Keystone* which

> "* * * stands upon the distinction that the act of 1836, which governed that patent, called for prior description in a 'public work,' instead of in a 'printed publication,' as is specified in the present statute, and in the latter (C.C. Mich.) this distinction was overlooked."

In this statement the Court apparently overlooked the fact that the Statute of 1836 (Sec. 7), see Appendix B, page 38 hereof, relating to the requirements for novelty of an invention used the term "printed publication", the same as in the present statute and referred to a "printed publication" as a bar to a patent.

Furthermore, the question of whether a catalogue is more effective in spreading information than if the catalogue were on file in some public library is unsubstantiated guesswork and entirely beside the fact that the statute calls for a printed publication, the very essence of the difference being that it shall be a publication accessible to the general public and not to some special small group. Moreover, the decision is not controlling in the case at bar because there the Court was dealing with a trade catalogue found by the Court upon the facts in that case to have been circulated publicly. In the case at bar we are dealing not with a trade catalogue but a mere leaflet, proven only to have been sent to two firms. Beyond this there is no evidence except the vague unsupported recollection of Pleger. The *Imperial Glass* case, we submit, is not to be taken as authority that every bit of printed matter is a publication and although the case has been cited and followed frequently, running through all of the later decisions is the rule that whether or not the printed matter is a publication depends upon the facts in the case.

For example, in *Jockmus* v. *Leviton,* 28 Fed. (2d) 812, the Circuit Court of Appeals for the Second Circuit, in a case where the catalogue was printed yearly, *dated,* and at least a thousand were sent out, held that the uncorroborated testimony of two witnesses would not be sufficient to prove publication. It said (p. 814):

> "This would not be enough if the catalogue itself were not produced bearing its own evidence of existence since 1908, * * *."

In the case at bar the catalogue is not dated, there was only one witness, and no corroboration.

5. Conclusion.

It is respectfully submitted that the decree of the District Court should be reversed and a decree entered authorizing the Commissioner of Patents to issue a patent to Blanks as prayed for.

Respectfully submitted,

Clifton V. Edwards,
Edward A. Hathaway,
John B. Brady.

APPENDIX A

Claims in Suit

1. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate of applying load to the specimen.

2. The combination set forth in claim 1 further characterized in that said indicating member which is driven at a predetermined rate of speed has provision whereby it may be manually reset.

3. The combination set forth in claim 1 further characterized in that said indicating members are in superimposed relation.

4. The combination set forth in claim 1 further characterized in that supporting means are provided for said indicating members whereby they may move in alignment with each other.

5. The combination set forth in claim 1 further characterized in that means are provided for supporting said indicating members for rotation about a common axis.

6. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a stress indicating hand, an auxiliary hand, means for rotatably supporting said hands in superimposed axial relation, means for driving said auxiliary hand at a predetermined rate of speed, and means whereby the other hand is adapted to be driven in response to the test load, whereby the

relative positions of said hands may be used to determine the rate of applying load to the specimen.

7. The combination set forth in claim 6 further characterized in that the driving means for the auxiliary hand has provision for driving the same at a constant rate of speed.

8. The combination set forth in claim 6 further characterized in that the driving means for the auxiliary hand has provision for driving the same at different constant rates of speeds.

9. An apparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a dial face, a hand rotatable thereover, means for actuating said hand in accordance with a condition of a test specimen, an auxiliary hand having a rotatable support disposed forwardly of said dial face, and means for driving said auxiliary hand at a predetermined rate of speed.

19. In a pressure gauge for use in progressively applying fluid pressure at a desired time rate, a dial, a rotatable fluid pressure indicating hand mounted on a shaft and movable over said dial, an auxiliary hand rotatable about the same axis as said pressure indicating hand and movable over said dial, and means for driving said auxiliary hand at a constant speed.

20. In a pressure gauge for use in progressively applying fluid pressure at a desired time rate, a dial, a rotatable fluid pressure indicating hand mounted on a shaft and movable over said dial, operating mechanism for moving said hand in response to pressure changes in a line leading to said pressure gauge, an auxiliary hand rotatable about the same axis as said pressure indicating hand and movable over said dial, and means independent of the operating mechanism of the pressure indicating hand for driving said auxiliary hand at a constant speed.

22. In a pressure gauge, a dial, a rotatable pressure indicating hand movable over said dial, an auxiliary hand rotatable about the same axis as said pressure indicating hand, means for driving said auxiliary hand at a constant speed, and reset means for manually positioning said auxiliary hand.

23. The combination in an apparatus for effecting a pretermined rate of load change applied to a test specimen in a materials testing machine having opposed specimen-engaging elements one of which is moved to apply load to the specimen; comprising, a rate of load member movable at the precise predetermined rate of speed at which it is desired to apply load progressively to a specimen at each instant during a test irrespective of deformation characteristics of the specimen, means for continuously driving said member at said speed, a load indicating member movable in accordance with the actual load applied to the specimen and movable adjacent to said rate of load member in visible register therewith so long as load is actually applied to the specimen at said predetermined rate, means for actuating said load indicating member solely in accordance with the load force applied to the specimen, and adjustable means for controlling the application of load to the movable specimen engaging element of the testing machine whereby the operator may control the application of load force to the specimen and simultaneously observe whether said registered relation is being maintained.

APPENDIX B

STATUTES INVOLVED

Act of July 4, 1836 (5 Statutes at Large 117),

> "Section 7. And be it further enacted, That on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been invented or discovered by any other person in this country prior to the alleged invention or discovery thereof by the applicant, or that it had been patented *or described in any printed publication in this or any foreign country,* or had been in public use or on sale with the applicant's consent or allowance prior to the application, if the Commissioner shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examination, it shall appear to the Commissioner that the applicant was not the original and first inventor, or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented, *or described in any printed publication in this or any foreign country,* as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him, briefly, such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification, to embrace only that part of the invention or discovery which is new. * * *" * (Italics by counsel.)

> "Section 15. And be it further enacted, That the defendant in any such action shall be permitted to plead the general issue, and to give this act and any special matter in evidence, of which notice in

---

*The remainder of the section deals only with the further prosecution or withdrawal of the application.

writing may have been given to the plaintiff or his attorney, thirty days before trial, tending to prove that the description and specification filed by the plaintiff does not contain the whole truth relative to his invention or discovery, or that it conains more than is necessary to produce the described effect; which concealment or addition shall fully appear to have been made for the purpose of deceiving the public, or that the patentee was not the original and first inventor or discoverer of the thing patented, or of a substantial and material part thereof claimed as new, or that it had been described in some public work anterior to the supposed discovery thereof by the patentee, or had been in public use or on sale with the consent and allowance of the patentee before his application for a patent, or that he had surreptitiously or unjustly obtained the patent for that which was in fact invented or discovered by another, who was using reasonable diligence in adapting and perfecting the same; * * *".

Act of July 8, 1870 *as amended*

c. 230, §24, 10 Stat. 201; as amended March 3, 1897 c. 391, §1, 29 Stat. 692; and May 23, 1930, c. 312, §1, 46 Stat. 396 (U. S. C., Tit. 35, §31).

R.S. 4886. Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, or who has invented or discovered and asexually reproduced any distinct and new variety of plant, other than a tuber-propagated plant, not known or used by others in this country, before his invention or discovery thereof, and not patented *or described in any printed publication in this or any foreign country,* before his invention or discovery thereof or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor. (Italics by counsel.)

Act of July 8, 1870

c. 230, §9, 27 Stat. 436; March 2, 1927, c. 273, §11, 44 Stat. 1336; March 2, 1929, c. 488, §2(b), 45 Stat. 1476, (Title 35, U. S. C. §63).

R.S. 4915. Whenever a patent on application is refused by the Commissioner of Patents, the applicant, unless appeal has been taken from the decision of the Board of Appeals to the United States Court of Customs and Patent Appeals, and such appeal is pending or has been decided, in which case no action may be brought under this section, may have remedy by bill in equity, if filed within six months after such refusal; and the court having cognizance thereof, on notice to adverse parties and other due proceedings had, may adjudge that such applicant is entitled, according to law, to receive a patent for his invention, as specified in his claim or for any part thereof, as the facts in the case may appear. And such adjudication, if it be in favor of the right of the applicant, shall authorize the commissioner to issue such patent on the applicant filing in the Patent Office a copy of the adjudication and otherwise complying with the requirements of law. In all cases where there is no opposing party a copy of the bill shall be served on the commissioner; and all the expenses of the proceedings shall be paid by the applicant, whether the final decision is in his favor or not. In all suits brought hereunder where there are adverse parties the record in the Patent Office shall be admitted in whole or in part, on motion of either party, subject to such terms and conditions as to costs, expenses, and the further cross-examination of the witnesses as the court may impose, without prejudice, however, to the right of the parties to take further testimony. The testimony and exhibits, or parts thereof, of the record in the Patent Office when admitted shall have the same force and effect as if originally taken and produced in the suit.

Act of July 8, 1870

c. 230, §61, 16 Stat. 208 (U. S. C. Tit. 35, §69).

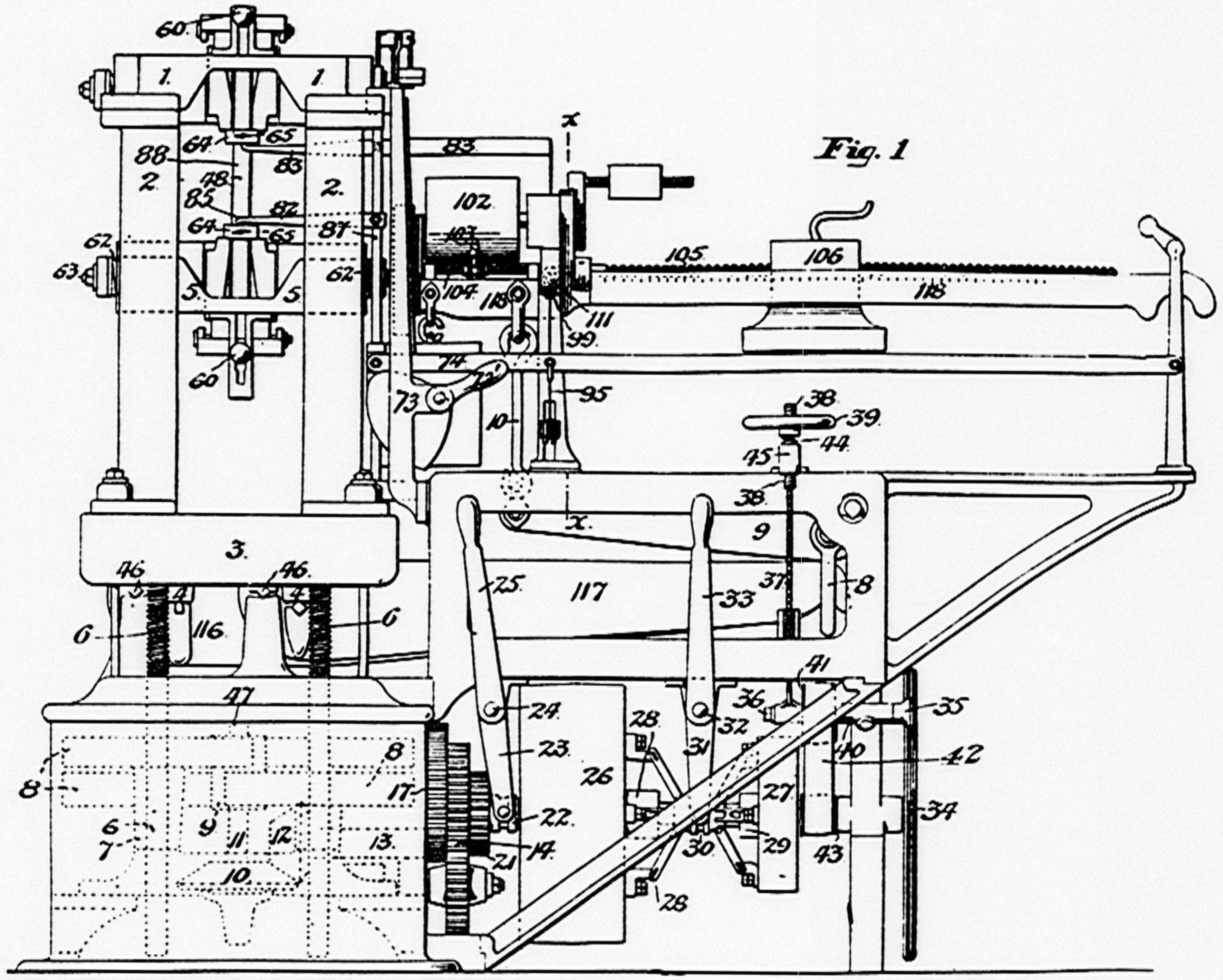
R.S. 4920. In any action for infringement the defendant may plead the general issue, and having given notice in writing to the plaintiff or his attorney thirty days before, may prove on trial any one or more of the following special matters: * * *

Third. That it has been patented or described in some printed publication prior to his supposed invention or discovery thereof, or more than two years prior to his application for a patent therefor; or, * * *.

PLAINTIFFS' EXHIBIT 10

Olsen patent 445,476—January 27, 1891

Appellants' App. 121



Uniform Head Motion was Common in Prior Art.

Olsen Machine (Screw Type).

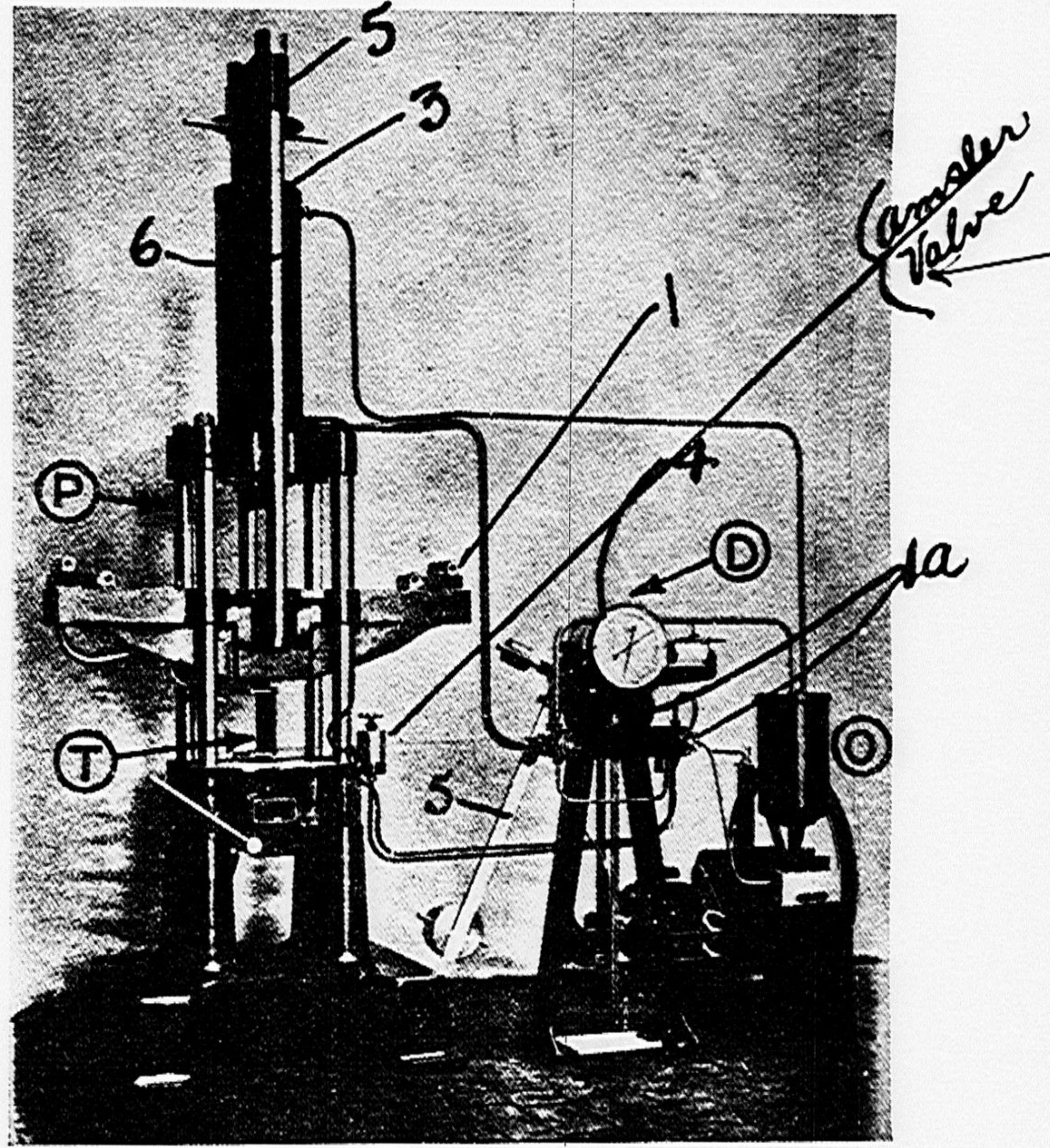
> "a uniform motion is imparted to the head (5)" (Appellants' App. 130, line 24).

Krause Disclosure Reasonably Interpreted

PLAINTIFFS' EXHIBIT 11

Amsler Machine

Appellants' App. 137



Amsler Machine (Hydraulic Pendulum Type).

> "These Amsler machines have the control entirely by the rate of head motion." . . . "This head is number 1. . . ." (Appellants' App. 74).
>
> Amsler patent (Appellants' App. 140, lines 28, 29; Appellants' App. 73) states: "the piston of the press moves always at the same speed".
>
> Amsler head motion control valve is marked "Amsler valve" in Plaintiffs' Exhibit 11 (Appellants' App. 68).

APPENDIX C

UNIFORM HEAD MOTION

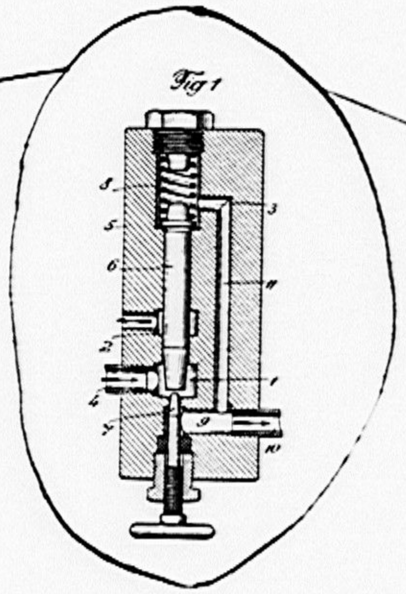
o have Prior Art "Head Motion" Control (which is not Blanks Rate of Load Control)

PLAINTIFFS' EXHIBIT 12

Amsler Valve

Patent 1,467,522
Sept. 11, 1923

Appellants' App. 139



Amsler Head Motion Control Valve.

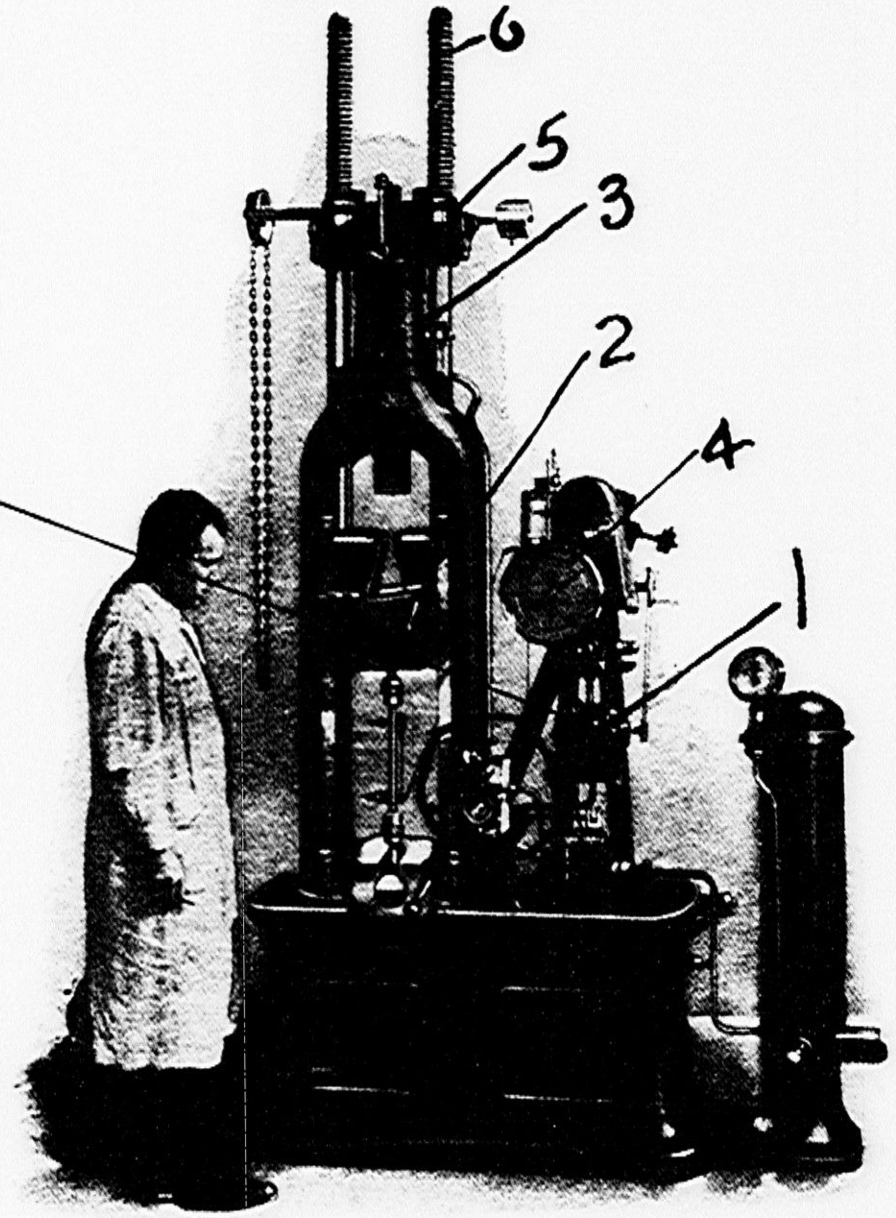
> ". . . Amsler found it necessary to introduce special valves which make the motion of the head uniform irrespective of the load on the specimen.
>
> That is referred to in the Amsler patent . . . 1,467,522" (Appellants' App. 66).

PLAINTIFFS' EXHIBIT 14

Krause Leaflet

1930

Appellants' App. 145



Krause Machine same type as Amsler.

> "Both are hydraulic machines of the vertical type. . . . The Amsler is the typical pendulum type, marked number 5. The Krause according to the description is also of the pendulum type." (Appellants' App. 73).

Krause equipped with Amsler head motion control valve.

> Amsler valve is "marked Number 1 on Plaintiff's Exh. 14", Krause leaflet (Appellants' App. 74, Q. 45; 73, Q. 37, Q. 40).
> Q. 37. Mr. Emery, on the Krause bulletin will you point out where the head is that would have the uniform rate of head motion according to the Amsler control valve, which you say is shown in that Krause bulletin?
> A. It is the intermediate head, marked number 2, which is just above the test specimen.

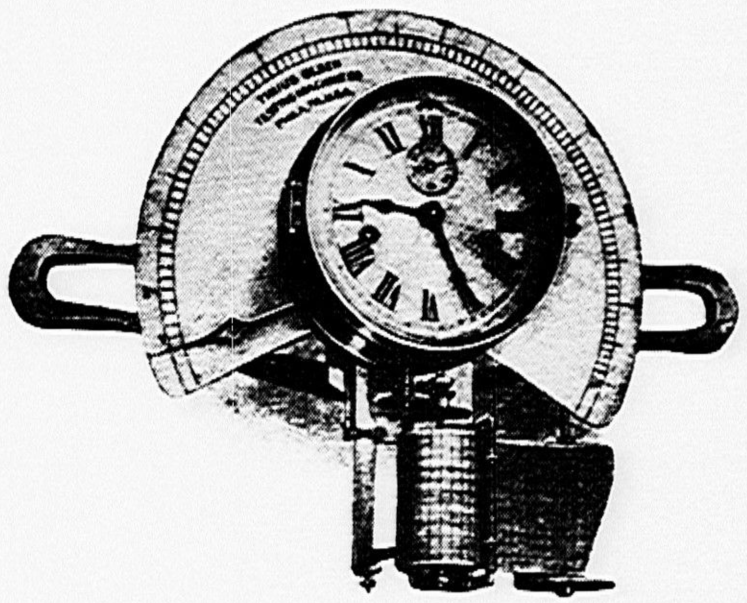
No mention or showing of predetermined rate of *load* application. Pointers widely separated, giving no hint of one being a pacer hand. Two scales and two independent hands, one for each concentric scale. Merely measures "desired testing speed", whatever that may mean.

PLAINTIFFS' EXHIBIT 16

Clock and Indicating Scale

1920

Appellants' App. 157



Useful to time movement of head piece.

> "The time which elapses between yield strength and fracture may be measured by means of a watch, using a speed of head which, it is estimated, gives approximately the desired rate of strain." (Jones & Moore, Exhibit 15, Appellants' App. 155; Abrams, Appellants' App. 85).

No pacer hand.
No predetermined rate of load control.

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA

FILED MAY 16 1941

Joseph W. Stewart
CLERK

Brief for Appellee

United States Court of Appeals for the District of Columbia

Appeal No. 7821

BALDWIN-SOUTHWARK CORPORATION and ROBERT F. BLANKS,
APPELLANTS

v.

CONWAY P. COE, COMMISSIONER OF PATENTS, APPELLEE

APPEAL FROM JUDGMENT OF THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

W. W. COCHRAN,
Solicitor, United States Patent Office,
Attorney for Appellee.

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In the United States Court of Appeals for the District of Columbia

No. 7821

Baldwin-Southwark Corporation and Robert F. Blanks,
appellants

v.

Conway P. Coe, Commissioner of Patents, appellee

APPEAL FROM THE JUDGMENT OF THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

This is an appeal from the judgment (Appendix, 93) of the District Court of the United States for the District of Columbia dismissing a Complaint (Appendix, 2) in which appellant sought to have the Court authorize the Commissioner of Patents to issue a patent on the application of appellant Robert F. Blanks, Serial No. 637,298, entitled "Materials Testing Equipment."

STATEMENT

The application of Blanks was filed in the Patent Office on October 11, 1932. The claims on appeal are numbered 1 to 9, inclusive, 19, 20, 22, and 23 (Appendix, 3–5).

The application relates to a machine for testing materials to determine the amount of elongation, compression, or bending thereof under varying loads. It has been recognized as desirable in making tests, that the load be applied to the specimen progressively and at a constant time rate. The rate of application of the load is controlled by the operator of the machine and the load is indicated by pointer 3 shown in the drawing (Appendix, 17). To aid the operator in keeping the movement of this hand at a uniform rate there is provided a second pointer 13 which is driven at a uniform rate by clockwork. This pointer is used as a pacer for the load indicating pointer. By so controlling the application of the load as to keep the two pointers together or spaced by a constant amount, the constant application of the load will be attained.

The District Court in its Conclusions of Law (Appendix, 92) held that the claims on appeal recite nothing patentable over the disclosure made in a circular issued by Ernst Krause & Co. A-G in Vienna, Austria, early in 1930, and that the circular is a printed publication within the meaning of Sections 4886 and 4887 R. S. (U. S. C., title 35, secs. 31 and 32) (Appellee's Appendix, —).

Appellants contend that these holdings are in error.

SUMMARY OF ARGUMENT

I. Claims 1, 3, 4, 5, 6, 7, 9, 19, 20, and 23, on appeal, are fully met by the disclosure in the Krause circular. One of the pointers shown in Fig. 1 of the circular indicates directly the load which is being applied to the test specimen. The other pointer is a clock hand mounted on the same axis as the first pointer. Being a clock hand, it moves at a constant rate.

II. The remaining claims 2, 8, and 22 are not patentable since they distinguish from the Krause disclosure only in details which are conventional.

III. The evidence establishes that the Krause circular was distributed to the trade more than two years before the application of Blanks was filed in the Patent Office.

IV. It is well-established law that trade circulars are publications within the meaning of Sections 4886 and 4887 R. S. (U. S. C., title 35, secs. 31 and 32). By reason of the fact that such circulars or catalogues are sent to those who are directly interested in the particuar art to which they relate, better dissemination of the information contained therein is attained than would be attained by a general publication.

V. The fact that the Kraus circular is a foreign publication in no way lessens its force as a bar to the allowance of the claims on appeal. The statutes making prior publications a bar make no distinction between foreign and domestic publications.

ARGUMENT

I. Certain claims fully met by Krause circular

The Krause circular is reproduced in several places in appellants' appendix. The clearest reproduction seems to be the one beginning on page 57. There is a translation beginning on page 95. It will be evident from the illustration Figure 1 and the description, that the machine is for making tests of specimens under tension, compression, bending, etc. It is stated that the machine provides for the finest regulation of the testing speed and provides clear visibility of the tests on a pendulum manometer. This latter is the large gauge shown in about the center of Figure 1. It is stated (Appendix, 96) that the gauge gives a direct reading of the loading on the specimen. The equivalent statement is also made that the gauge gives a reading of the exerted power. It should be noted here that the amount of progressive stretching or compression of the specimen may not, and probably will not, be directly proportional to the amount of load placed thereon by the machine and it should further be noted that the gauge indicates the load on the specimen and not the resulting deformation of the specimen.

The description of the Krause machine goes on to say:

> For measuring of a desired testing speed (in accordance with acceptance regulations of the German Railroad), a time clock is used which is built into the pendulum scale. The hand of the clock is arranged concentric with the hands of the scale.

It is submitted to be obvious from this statement and from the previous description that one of the pointers shown on the gauge indicates the load and the other pointer is a clock hand for measuring the speed of testing. Appellants attempted to establish by the testimony of the witness Emery

(Appendix, 63, 75) that neither of the pointers shown on the Krause gauge is a clock hand. His explanation was that one pointer appears to be a maximum hand, i. e., a hand which in the operation of the machine would be carried along with the load indicating hand as the load is increased and remain at the final position when the load is released, to indicate the maximum load that was applied in the test. This explanation ignores the fact that the illustration of the Krause gauge clearly shows two different scales—one for each pointer (Appendix, 47). If one of the pointers were merely a maximum hand, both would move over the same scale. The explanation does not explain what has become of the clock hand described in the Krause leaflet as being arranged concentric with the gauge hand. Notwithstanding the statements of the witness, it is believed to be clear from the description and illustration that one of the pointers of Krause is a clock hand.

Much of appellant's argument and evidence relates to the method of using the device, and the advantages attained by the method. The advantage most stressed is that the operator by properly controlling the application of the load, can make the load indicating pointer keep pace with the clock hand and thus apply the load at a constant time rate. But none of the claims on appeal is for a method, all are for apparatus.

Claims 1, 3, 4, 5, 6, 7, 9, 19, 20, and 23 appear to be fully met by the Krause circular.

Claim 1 (Appendix 14) reads as follows:

> 1. An aparatus for determining a predetermined rate of load change applied to a test specimen in a materials testing machine comprising, in combination, a plurality of indicating members adapted to have similar paths of movement in relatively close relation for purposes of common visible comparison, means for driving one of said indicating members at a predetermined rate of speed, and means whereby the other member is adapted to be driven in response to the test load, whereby the relative positions of said members may be used to determine the rate applying load to the specimen.

The plurality of indicating numbers recited in the claim are the two pointers shown on the Krause gauge. They obviously have similar paths of movement, both being pivoted for movement about a common axis, and are in relatively close relation for visible comparison. One of them is described in the Krause circular as a clock hand—i. e., a hand moving at a predetermined rate of speed. The other is described as showing the load applied to the specimen. The claim is thus clearly met.

It is also clear that the pointers of the Krause machine are in superimposed relation, as recited in claim 3; that they are so supported that they may move in alinement with each other, as recited in claim 4; and that they rotate about a common axis as recited in claim 5.

Claims 6, 7, 9, 19, and 20 are similar to the claims just discussed and require no further comment.

Claim 23 contains the limitation that the clock hand moves at the desired rate of application of the load. This is not a definite structural limitation, since the desired rates will be different for different tests.

II. Claims 2, 8, and 22

These claims include details not specifically mentioned in the Krause circular, but these details are conventional in clocks, and therefore do not lend patentability to the claims.

Claims 2 and 22 distinguish from the Krause circular, if at all, only by reciting that the clock has provision for resetting the hand. As every conventional clock is constructed to allow resetting, it may be assumed that the Krause clock has such means. The same is true of the provision recited in claim 8 for driving the clock at different rates of speed. All conventional clocks, except electric ones, have regulators. These claims therefore do not distinguish patentability from the Krause disclosure.

III. The distribution of the Krause circular

In the District Court and previously in interference proceedings in the Patent Office appellants disputed the fact that the distribution of the Krause circular was such as to constitute a publication thereof more than two years prior to the filing of the application of appellant Blanks in the Patent Office on October 11, 1932. Testimony on this matter was taken abroad and is included in appellants' appendix, page 38 et seq.

The testimony of Gadolla was to the effect that he had seen the circular in the winter of 1929, and that his firm had ordered the machine on July 25, 1929, and received it in September 1929.

The testimony of Nitsch, who was employed by another firm, was to the effect that he had seen the circular in January or February of 1930, and that his firm ordered the machine on March 6, 1930, and received it on April 30, 1930.

The testimony of Nitsch was corroborated by that of the witness Gosch.

The witness Curt Pleger, a manager at the firm of Ernst Krause & Co. A-G, testified that the circular was prepared and printed in the first half of 1930, and that it was distributed in the course of the months following July 1930. He named five firms to which the circular had been sent, and stated it had been sent to others.

The variance between the testimony of Pleger and that of the other witnesses as to the date of distribution of the circular may possibly be explained by the fact that the circular appears to have been issued in various editions, as is evidenced by the notation "Do. 82" appearing on Exhibit A (Appendix, 47), and the notation "Do. 72" appearing on Exhibit G (Appendix, 57).

In any event, it is submitted that the variance in the testimony is not important, since all of the dates specified are more than two years before the application at bar was filed in the Patent Office.

IV. Trade circulars are publications

It is submitted that trade circulars are clearly publications within the meaning of Sections 4886 and 4887 R. S. (Appellee's Appendix, —).

Previous to the decision of Justice Denison in *Imperial Glass Co.* v. *A. H. Helsey and Co.*, 294 Fed. Rep. 267, there was some doubt that such circulars were printed publications and certain decisions had been rendered holding that they were not. In his decision, which appears to have been followed in all later cases, Justice Denison discussed the previously rendered decisions and held that such circulars are printed publications. He said:

> * * * The defendant produced printed catalogues of different glass manufacturers, including some of its own, all evidently issued for circulation among the trade, and all of which defendant's superintendent testified had been in his possession since before 1911. These catalogues showed a great variety of designs tending to support the defense, and, if they do not anticipate, they at least emphasize the trifling character of the distinction upon which the patent must stand. The trial court rejected these, thinking that they were not prior publications within the meaning of the patent law, and basing this conclusion upon *Reeves* v. *Keystone Co.,* Fed. cases No. 11,660, vol. 20, pp. 466, 471; and *Britton* v. *White Co.,* 79 O. G. 2198; 1897 C. D. 508; 61 Fed. Rep. 93. We think these catalogues should have been received and considered. Certainly, manufacturer's catalogues so circulated are more effective in spreading information among persons skilled in that art than if the same catalogues were only on file in some public library. *Reeves* v. *Keystone Co.,* arising under the act of 1836, merely holds that the publication of a manufacturer's catalogue, which is not found in a library, must be proved by some evidence other than the imprint, Whether such imprint would, under the present statute, be prima facie evidence of publication need not be decided. The evidence of the superintendent that these catalogues had been sufficiently circulated to bring them to his notice and possession is enough to indicate due publication. The decision in *Britton* v. *White Co.* (D. C. Conn.), seems to be in point, but we think it is mistaken. It depends (61 Fed. Rep. 95) upon *Reeves*

> v. *Keystone Co.* (which, as we have seen, does not support it); *Parsons* v. *Colgate,* 24 O. G. 203; 1883 C. D. 319; 15 Fed. Rep. 600, and *New Fermentation Co.* v. *Koch,* 29 O. G. 535; 1884 C. D. 421; 21 Fed. Rep. 587. The former (D. C., N. Y.) stands upon the distinction that the act of 1836, which governed that patent, called for prior description in a "public work" instead of in a "printed publication," as is specified in the present statute; and in the latter (D. C., Mich.), this distinction is overlooked.

In a later decision by Justice Learned Hand, in *Jochmus* v. *Leviton et al.,* 28 F. (2d) 812, 813, the Court, after discussing previously rendered decisions, said:

> * * * The aggregate of these authorities is not so imposing as to cause us any hesitation in following the Sixth Circuit. On principle we are entirely in accord, for the purpose of the statute is apparent, and we ought to effect it so far as its language will allow. While it is true that the phrase, "printed publication," presupposes enough currency to make the work part of the possessions of the art, it demands no more. A single copy in a library, though more permanent, is far less fitted to inform the craft than a catalogue freely circulated, however ephemeral its existence; for the catalogue goes direct to those whose interests make them likely to observe and remember whatever it may contain that is new and useful.

The same holding was made in *McGhee et al.* v. *La Sage & Co., Inc.,* 32 F. (2d) 875; in *O. K. Jelks & Son et al.* v. *Tom Huston Peanut Co.,* 52 F. (2d) 4, 9; and in *Kester Solder Co.* v. *Berry Solder Co.,* 14 F. Supp. 863, 867.

It is submitted that the net effect of these decisions is that a circular distributed among those interested in the particular art is a "printed publication" within the meaning of the patent law notwithstanding that the catalogue may not have been placed in a public library and notwithstanding that it may be ephemeral and not in permanent form. That such is the law has been accepted in the Patent Office practice and seems to have been accepted by the courts since the decision of Justice Denison.

V. Foreign publications have the same weight as domestic publications

With reference to the weight to be given a foreign publication, it is submitted that foreign and domestic publications have the same weight under the statute.

Section 4886 R. S. provides that an applicant is not entitled to a patent if his invention has been "patented or described in any printed publication *in this or any foreign country* before his invention or discovery thereof."

Thus the statute makes no distinction whatever between foreign and domestic publications.

While it is true that a foreign patent "stands simply for what is disclosed, and not for what by some possibility could be made of it, as was said in *Cimiotti Unhairing Co.* v. *American Fur Refining Co.*, 120 Fed. Rep. 677, cited by appellants, yet the same thing could be said of a domestic patent or publication. No reference, whether it be foreign or domestic, is good for anything more than it teaches.

As showing the weight to be given foreign patents and publications, the following authorities will be of interest:

In re Watson, 44 F. (2) 868, 18 C. C. P. A. 994.
In re Cross, 62 F. (2d) 182, 20 C. C. P. A. 710.
In re Crowley, 74 F. (2d) 753, 22 C. C. P. A. 881.
In re Clarkson, 95 F. (2d) 259 25 C. C. P. A. 1004.
In re Sherman, 104 F. (2d) 619, 26 C. C. P. A. 1337.
Becket v. *Coe,* 98 F. (2d) 332, 69 App. D. C. 51.

In *Truessell Mfg. Co.* v. *Wilson-Jones Co.,* 50 F. (2d) 1027 (C. C. A. 2), Justice Swan stated the rule that to be an anticipation a disclosure must be clear and then said, with reference to a German patent which had been cited:

> * * * This disclosure is not sufficiently clear to satisfy the rule already mentioned. Indeed, it has been urged that that rule must be applied more

> strictly to foreign than to domestic patents. Much may be found in the books which seems to support such a distinction. See *Seymour* v. *Osborne,* 11 Wall. 516, 555, 20 L. Ed. 33; *Hanifen* v. *E. H. Godshalk Co.,* 84 F. 649, 651 (C. C. A. 3); *In re Elk,* 57 App. D. C. 203, 19 F. (2d) 677, 678. However, we see little basis for it. An inventor is charged with knowledge of whatever the prior art discloses, but the disclosure, to be an anticipation, must be clear and certain. Why it need be more clear in a foreign patent than domestic one, we confess is not obvious to us.

CONCLUSION

It is submitted that the Krause circular is a publication within the meaning of the law, that it was published more than two years before appellant filed his application, and that the claims on appeal recite nothing amounting to invention over the disclosure of this circular.

It is therefore urged that the judgment of the District Court was proper and should be affirmed.

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May 1941.

APPENDIX

Sec. 4886. (U. S. C., title 35, sec. 31.) Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, or who has invented or discovered and asexually reproduced any distinct and new variety of plant, other than a tuber-propagated plant, not known or used by others in this country, before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof or more than one year prior to his application, and not in public use or on sale in this country for more than one year prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor. [The period is *two years* instead of "one year" where the application was filed prior to Aug. 5, 1940. See Sec. 2 of Act of Aug. 5, 1939, printed after R. S. Sec. 4886.]

Act of Aug. 5, 1939, 53 Stat. 1212:

Sec. 2. This Act [amending sections 4886, 4887, 4920, and 4929 of the Revised Statutes (U. S. C., title 35, secs. 31, 62, 69, and 73) by changing "two years" to *one year*] shall take effect one year after its approval and shall apply to all applications for patent filed after it takes effect and to all patents granted on such applications: *Provided, however,* That all applications for patents filed prior to the time this Act takes effect and all patents granted on such applications are to be governed by the statutes in force at the time of approval of this Act as if such statutes had not been amended.

Revised Statutes, Title LX:

Sec. 4887. (U. S. C., title 35, sec. 32.) No person otherwise entitled thereto shall be debarred from receiving a patent for his invention or discovery, nor shall any patent be declared invalid by reason of its having been first patented or caused to be patented by the inventor or his legal representatives or assigns in a foreign country, unless the application for said foreign patent was filed more than twelve months, in cases within the provisions of section forty-eight hundred and eighty-six of the Revised Statutes, and six months in cases of designs, prior to the filing of the application in this country, in which case no patent shall be granted in this country.

An application for patent for an invention or discovery or for a design filed in this country by any person who has previously regularly filed an application for a patent for the same invention, discovery, or design in a foreign country which, by treaty, convention, or law affords similar privilege to citizens of the United States shall have the same force and effect as the same application would have if filed in this country on the date on which the application for patent for the same invention, discovery, or design was first filed in such foreign country, provided the application in this country is filed within twelve months in cases within the provisions of section forty-eight hundred and eighty-six of the Revised Statutes, and within six months in cases of designs, from the earliest date on which any such foreign application was filed. But no patent shall be granted on an application for patent for an invention or discovery or a design which had been patented or described in a printed publication in this or any foreign country more than one year before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country for more than one year prior to such filing. [The period is *two years* instead of "one year" where the application was filed prior to Aug. 5, 1940. See Sec. 2 of Act of Aug. 5, 1939, printed after R. S. Sec. 4886, *ante*.]

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